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THE HOME AND SCHOOL REFERENCE WORK

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VOLUME VI

THE HOME AND SCHOOL EDUCATION SOCIETY

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Prov'erbs, one of the books of the Old Testament. It is a manual of practical rules for living, a guide to action. The book of *Proverbs* may be divided as follows: (1) Introduction—the value of wisdom (*i-ix*); (2) the Proverbs of Solomon (*x-xxii, 16*); (3) Introduction —the study of wisdom (*xxii, 17-xxiv*); (4) a second volume of Proverbs, collected by those whom Hezekiah set to restore the Temple of worship (*xxv-xxix*); (5) an Appendix (*xxx, xxxi*). The chief author of the *Proverbs* was Solomon, but other portions were collected and added later. The date of the final arrangement is uncertain, but it is thought to be in the time of Hezekiah. See BIBLE, subhead *The Old Testament.*

Prov'idence, R. I., a city, port of entry, county seat of Providence Co. and capital of the State of Rhode Island, 44 m. s.w. of Boston and 187 m. n.e. of New York, on the Providence River, a tidal arm of Narragansett Bay, and on the New York, New Haven & Hartford Railroad. Providence is the second city in New England in population, wealth and importance. The city is situated 35 m. north from the ocean and has steamer connection with Newport, New York, Philadelphia, Baltimore, Norfolk and other cities. Providence is irregularly laid out and has an area of over 18 sq. m. Among the advantages of the city as a center of commerce are those pertaining to its geographical position, as it is the natural outlet of southern New England. The textile-manufacturing industries are located largely along the banks of the Woonasquatucket and Moshassuck, two small streams which divide the western portion of the city. Beyond the city limits populous suburbs extend for many miles. Providence is the center of a great network of electric railroads, extending to all parts of Rhode Island, southeastern Massachusetts and eastern Connecticut.

PARKS AND BOULEVARDS. The city has many miles of well-kept boulevards and streets. There are 32 parks, comprising about 649 acres. Roger Williams Park, the first municipal reservation, is located in the southern portion of the city. It comprises 432 acres of forest, rolling hills and beautiful lakes. The park contains a statue of Roger Williams, by Simmons, and the Dyer Fountain, designed by Kitson.

PUBLIC BUILDINGS. Providence has taken advantage of the opportunity to create a beautiful civic center. Exchange Place, a rectangular plaza, formerly covered by tidewater, now occupies the center of the city. On the west end of the plaza stands the city hall, while the north side is occupied by City Hall Park, containing about two and one-half acres ornamented with stately elms and shrubbery. In this park are located an equestrian statue of Gen. Ambrose E. Burnside, the Bajnotti Memorial Fountain and the statue of Maj. Henry H. Young, Second Rhode Island Volunteers, chief of scouts to Gen. Philip H. Sheridan. Back of this park are located the Union Station and the office buildings of the New York, New Haven & Hartford Railroad. Farther to the north, on Capitol Hill, stands the marble State House overlooking the city. At the east end of Exchange Place is located the Federal Building, while the south side is occupied by office buildings. In the center of the plaza is located the Soldiers and Sailors' Monument, designed by Randolph Rogers. Among other public buildings are the state armory, state normal school, Old State House, Providence County Courthouse and the meeting house of the First Baptist Church, founded by Roger Williams and built in 1775. The Friends' Meeting House, another interesting old building, was erected in 1759. Providence is the seat of an Episcopal bishopric and of a Catholic see. The Cathedral of SS. Peter and Paul (Catholic), noteworthy for its impressive interior, stands in Cathedral Square. The museums and libraries are noteworthy and include the Annmary Brown Memorial, a treasure house of art which was erected by Gen. Rush C. Hawkins of New York as a memorial to his wife; Providence Public Library; the Rhode Island Historical

Museum, which contains the state's best collection of history and genealogy; the Athenæum and the Pendleton House. Several magnificent mansions are classed among the places of interest and are among the finest examples of colonial architecture in New England.

INSTITUTIONS. Foremost among the educational institutions is Brown University (See BROWN UNIVERSITY), one of the eight colleges in the United States founded before 1776. Here George Washington received his degree of LL. D. in 1790. The college is closely allied with the history of Rhode Island and the Baptist Church in America. Other institutions are the Academy of the Sacred Heart, Moses Brown School (Friends), the Rhode Island Normal School, Institute for the Deaf, Rhode Island School of Design, LaSalle Academy and St. Xavier's Academy (Catholic). Besides the primary, grammar and high schools, the public schools include fifteen for sub-normal children, three ungraded, three open-air, many evening schools and a trade school.

The philanthropic and charitable institutions include Dexter Asylum, Home for Aged Men and Aged Couples, Home for Aged Women, St. Vincent de Paul Infant Asylum, the Butler, Homeopathic, Rhode Island and St. Joseph's hospitals and St. Elizabeth's and Bethany homes.

INDUSTRIES. Providence is noted for the high grade of its manufactured products. The city has the largest mechanical-tool factory, file factory, engine factory, screw factory and silverware factory in the world. It had 1080 manufactories with a capital of $118,512,000 and with an annual production of $120,328,000, according to the United States census for 1910. Providence is the first city in the country in the manufacture of woolen and worsted goods, jewelry and silverware. There are large manufactories of machinery, enamels, fine scales, patent medicines, hardware, leather belting, shuttles, bobbins and windlasses. Bleaching and dyeing, metal refining, brewing and meat packing are also important industries.

HISTORY. Providence was founded by Roger Williams in 1636. After his banishment from Massachusetts in 1635 and his flight through the wilderness he agreed with Canonicus and Miantonomo, the Narragansett sachems, for the purchase of a tract of land. Here he built his house and named the place Providence in recognition of his divine guidance hither. This grant of land covered what is now that part of Rhode Island west of Narragansett Bay, and is the earliest deed on record, being a memorandum, dated March 24, 1637. In 1638 articles of agreement were adopted by the settlers, and in 1644 a Parliamentary Patent was obtained, uniting various settlements about the bay as "Providence Plantations in the Narragansett Bay of New England."

Among the historic places are What Cheer Rock, where Roger Williams landed and was greeted by the Indians with "what cheer, netop" (friend), Ft. Independence, homestead of Esek Hopkins, the first admiral of the American navy, and the grave of Roger Williams in the yard of the Dorr House. Population in 1920, U. S. census, 237,595.

Providence Plantations, the name under which the towns of Providence, Portsmouth and Newport were incorporated in 1644. Roger Williams, aided by Sir Henry Vane, secured the charter which authorized such laws as were pleasing to the majority of inhabitants. To a commission, created for the management of all English plantations in America, was reserved the power to make such changes as seemed necessary regarding its relations with other colonies. See RHODE ISLAND.

Pro'vo, Utah, a city and the county seat of Utah Co., about 48 m. s. of Salt Lake City, on the Provo River and on the San Pedro, Los Angeles & Salt Lake, the Rio Grande Western and other railroads. It lies in a farming, fruit-growing and stock-raising section, and a large revenue is derived from these pursuits. The principal factory products are flour, woolen goods, iron and tin roofing, lumber and canned fruit. A considerable

trade in lumber, live stock, fruit and other farm products is carried on. The city is the seat of Brigham Young University (Latter Day Saints) and of the Utah State Insane Asylum; there is also a Mormon Tabernacle. In the vicinity are Bridal Veil Falls, Utah Lake and Provo Cañon, much visited for their scenic beauty. Settled in 1849, Provo was first chartered as a city in 1851. Its present charter provides for the commission form of government. Population in 1920, U. S. census, 10,303.

Prune, any plum which may be dried without fermenting. Many such plums are raised in Germany and France and are there packed in boxes and sold as sweetmeats to be eaten uncooked. The common prunes on the market in the United States are a California product which must be cooked in order to be pleasing to the taste. Until recently the United States market was supplied by southern Europe.

Pru'ning, the process of cutting off the branches, shoots or roots of trees and plants for the purpose of assisting growth in other parts. The immediate effect is to hinder growth and to produce a hardier and larger plant. The gardener, desiring to change the form of trees or to increase the size of the fruit or flowers, always delays the pruning until the plant is vigorous, so that its wound will heal quickly. Branches are always cut close to the part from which they are taken, and if the wound is large it should be covered over with wax, cement or paint, to protect it from the weather.

Prussia, *Prush' a.* The largest state in Germany, bounded on the north by the North Sea, Denmark and the Baltic Sea; on the East by Poland; on the south by Czecho-Slovakia, Saxony, Thuringia, Bavaria and Hesse; on the west by France, Luxembourg, Belgium, and the Netherlands. Its greatest length from southwest to northeast is about 575 miles. Its area is about 96,500 sq. m. It is larger than all the other German states combined. Estimated population in 1919, 36,000,000. See GERMANY.

There are three strands that unite to compose the history of Prussia,—the development of the Mark of Brandenburg; the political fortunes of the House of Hohenzollern, and the history of the Duchy of Prussia, now the province of East Prussia. The Mark of Brandenburg was originally the "North Mark" of the ill defined German Empire of the tenth century. It was established as a frontier mark to protect the provinces of the empire to the south from invading Slavic people from the east and northeast. Its position rendered it an important frontier mark though we hear but little of it until 1140 when its margrave, Albert the Bear, made Brandenburg his capital and changed its name to the Mark of Brandenburg. It was this Mark that slowly increased in power during the last eight centuries and finally became the modern state of Prussia. In 1356 the Golden Bull mentions the Margrave of Brandenburg as one of the seven electors of Germany.

In 1411 Frederick of Hohenzollern became Margrave of Brandenburg. That marks the first important accession to power of the House of Hohenzollern that for five centuries was the ruling house in Prussia and the central figure in so much of German history. The parallelism between the House of Hohenzollern and the House of Hapsburg is pointed out elsewhere. For the last thousand years they have been prominent in European history, the central figures indeed of German history. The one presided over the destinies of the Eastern Mark (Austria) until it became a great nation; the other sustained a similar relation to the North Mark (Mark of Brandenburg) until it became the German Empire, one of the great empires of history. During the troublous times of the Reformation, the electors of Brandenburg were friendly to the movement and the Mark suffered greatly during the religious wars of the times.

Primitive Prussia was not a German state, and the original Prussians were not Germans, but a people ethnically allied to the Letts and Lithuanians know

as the Borussi. Their territory was at first that now known as East Prussia. In the tenth century we find this Slavic people further west along the lowlands of the Oder, Vistula, and the Niemand, the north part of the present province of West Prussia. It was to protect against further invasions from these people that the North Mark was established.

Early in the thirteenth century, Poland, fearing the growing power of the Slavic state of Prussia, invited the religious-military order of the Teutonic Knights to invade Prussia. They conquered it and ruled it as an "Ordensland" from their headquarters at Marienberg on the Vistula for two centuries. Under their rule Prussians became Germanized, that is, the people ceased to be Slavic. In 1410 the Lithuanians, at that time a part of Poland, waged war on the Teutonic Knights and so completely defeated them that Poland annexed the province of West Prussia and made East Prussia a duchy owing allegiance to Poland. Two centuries later the elector of Brandenburg, John Sigismund, became by inheritance, the duke of (East) Prussia acknowledging, however, allegiance to Poland for his duchy. In 1657, that bond was cast off and for the next century and a quarter East Prussia was a detached section of the Electorate of Brandenburg. In 1701, the duke of Prussia, Frederick William I, was allowed to assume the title of "King in Prussia" that is, East Prussia became a kingdom, still separated from the electorate of Brandenburg by the Polish province of West Prussia. That condition remained nearly a century or until 1782 when Frederick the Great secured West Prussia as his part of the first partition of Poland. Three great figures in later Prussian history are treated with sufficient fullness under their respective titles—Frederick William, the Great Elector (1620-1688); Frederick the Great (1712-1786); and the founder of modern Germany, Bismarck. Notice during the thousand years of history here sketched the gradual growth of the small barrier state (the North Mark) of possibly 10,000 square miles in area to the Prussian state of nearly 135,000 square miles, prior to the World War.

Prus'sic Acid, or **Hydrocyanic,** *Hi" dro si an'ik,* **Acid,** an acid formed by the decomposition of certain extremely complex substances found in peach and cherry pits and in the almond. It is a colorless liquid and extremely poisonous; even its odor causes dizziness and irritation of the throat and nose. It easily decomposes when exposed to sunlight, and burns with a deep blue flame. If boiled with caustic soda and a salt of iron, and then treated with acid, a precipitate results which has an intense blue shade and is called Prussian blue. By this means the presence of Prussic acid is detected. Prussic acid was discovered by Scheele in 1782, and its composition determined to be hydrogen, carbon and nitrogen. An antidote for Prussic acid poisoning is hydrogen peroxide or small quantities of chlorine mixed with air.

Psalms, *Sahms,* a compilation of Hebrew songs and prayers, forming one of the books of the old Testament. Its composition extends over 1000 years of Israelitish history, from Moses to Malachi. Ezra and Nehemiah are thought to have arranged the psalms, which are not in chronological order. A division into five parts, of the book of *Psalms,* occurs in the Hebrew Bible. Part I (1-41) is the composition of David. Part II (42-72) is Levitic, compiled for the Temple worship in Hezekiah's time; David wrote 21 of these psalms. Part III (73-89) was compiled in the time of Josiah, for the same purpose. Part IV (90-106) was compiled during the Captivity. Part V (107-150) is miscellaneous; 17 of the psalms are Davidic, one is Mosaic.

The Bible version of the *Psalms,* made from the Hebrew in 1610, is more accurate, though less rhythmical, than the English Prayer Book version, taken from Cranmer's Bible (1539), which is admirably adapted for chanting. Christion liturgy and hymnology have for centuries been based on this remarkable collection of songs and prayers, and no

other book has ever been written which is so well adapted to be the medium of religious expression, through all ages and in all lands. See BIBLE, subhead *The Old Testament.*

Psyche, *Si' ke,* in classical myths, wife of Cupid, so beautiful that Venus found her altars deserted, while crowds flocked to worship this maid. Angered, the goddess instructed her son to inspire the beauty with love for some monster. Instead, Cupid fell in love with her himself, establishing her in a splendid palace, where he visited her only after dark, cautioning her that if she tried to discover him, he would leave her forever. One night, however, urged by curiosity that her jealous sisters had inspired, Psyche crept to her husband's couch, lamp in hand. So surprised was she to behold a handsome god, that she spilt a drop of burning oil on his shoulder and awakened him. Instantly Cupid vanished. Heartbroken, Psyche then entered the service of Venus, hoping thus to gain her favor and, through it, recover her lost husband. One of the many difficult tasks imposed upon her by the angry goddess was to fetch some of Proserpine's beauty. Prying into the box which she supposed contained it, Psyche was overpowered by a black sleep, from which she was awakened by Cupid, then on his way to plead her cause before Jupiter. Jove made her immortal; whereupon, Venus being reconciled to the girl, her marriage with Cupid took place mid great rejoicing.

Psychology, *Si kol' o jy,* the science which seeks to describe and explain the mental processes. It differs from logic, which deals with the truth or falsity of reasoning, from ethics, which has to do with the morals, and from metaphysics, which is the science of being and of knowledge. But just as the physical sciences of chemistry, geology and physics overlap, so these mental sciences cannot be distinctly separated. In its development psychology has roughly been divided into two great epochs, the first of which extends from the earliest psychological writings of Plato and Aristotle to as recent a date as 1860; and the second, from 1860 to the present. The first period is that of philosophical discussion, while the latter may be called the development of psychology as an independent and practical science. Every science has necessarily passed through these same phases, and the science of psychology differs chiefly in being slower in its application to practical problems.

The writers upon psychology have been so numerous and so prolific and they have warred so continuously over terms and theories that a discussion of these controversies would fill volumes. Their work, however, has laid a solid foundation for the modern phase of psychology.

The beginnings of the new psychology, which after all is not definitely marked off from the old, may be found in the scientific awakening of the last century. In 1875 Wundt at the University of Leipsic established the first psychological laboratory, whose object was merely the study of the most external problems of the mind, the sensations, the emotions and the motor impulses. Now there are over 100 psychological laboratories located in all civilized countries and equipped with apparatus for experimenting upon all the mental states which in the beginning were thought to be reached only by introspection. In aid of this work, over 15 magazines of psychological study are now in circulation, while in the middle of the 19th century there was not one. Many psychological discoveries, especially those of the nervous system, such as brain localization, its health, fatigue, etc., have joined to advance the science until at present psychology has reached the point where it can attack practical problems and become a permanent factor in all departments of life. This new applied psychology will find room for its labors in law courts, in medicine, in schools, in the pulpit and in the factory.

The study of psychology deals first with the mind in its various states of consciousness, feeling, imagining, perceiving, remembering, etc. These it

deals with not as distinct faculties but as potential powers, several of which may occupy the mind at a time. Having dealt with these states in the individual and normal mind, the science develops in different departments, such as animal psychology, child psychology, abnormal psychology, social psychology, educational psychology, etc. With its influence upon modern life, psychology can no longer rank as an impractical science whose usefulness does not extend beyond the range of the library, but rather as a new means of assistance to a knowledge of life. Consult Halleck's *Psychology and Psychic Culture; Education of the Central Nervous System;* Sully's *Outlines of Psychology;* James's *Psychology* (briefer course); Tracy's *Psychology of Childhood.*

Ptarmigan, *Tar' mi gan,* a group of grouse living in northern latitudes, and distinguished by having the legs feathered down to the toes. A number of species are known, of which the white-tailed ptarmigan is a good example. It is about 16 inches long. The summer plumage is barred and spotted black and brownish, with white wings, tail, legs and abdomen. The winter plumage is pure white. The nest is built on the ground and is made of grass. Ten to sixteen brown-spotted eggs are laid. These birds are beautiful examples of protection by color, the white plumage of the winter rendering them inconspicuous in the snow, and the mottled-brown plumage of the summer blending in with their surroundings. They are said to dive into the snow when pursued in winter.

Pterodactyl, *Ter" o dak' til,* a name applied to any one of the extinct flying lizards, the remains of which are found in the Mesozoic rocks occurring in some parts of Europe. They had the structure of serpents and the habits of birds. The bones were hollow as in birds. The body was short and rather stout; the hind legs long and slender and provided with long, branching fingers and hooked claws. A peculiar characteristic of the skeleton is the fourth or outermost finger bone of the upper limb, which is of a length almost equal to that of the entire body and which served to support a membranous batlike wing. The neck was rather long, and the head of relatively large size, with swordlike jaws, which came together in a beak similar to the beak of a bird.

Ptolemaic, System, *Tol" e ma' ik,* the system proposed by the astronomer Ptolemy in his *Almagest,* to account for the movements of the heavenly bodies. According to this system the earth is the fixed center of all things, neither rotating on an axis nor moving through space. Ptolemy believed with the mathematicians of his day that the circle was the only conceivable orbit for a heavenly body, and upon this theory made the hollow sphere of the heavens and all its bodies to revolve around the earth. Irregularities were accounted for by conceiving a body as revolving around a circle, the center of which revolved around the earth. This arrangement can be made to account in the rough for nearly all the movements of the solar system, and the instruments necessary to detect its errors were not in existence in Ptolemy's time. This explanation of the movements of the heavenly bodies was generally accepted for 14 centuries. See Astronomy; Copernicus, Nicholas; Ptolemy.

Ptolemy, *Tol' e my,* properly **Claudius Ptolemæus,** an ancient astronomer and geographer. He was a native of Egypt, living in A. D. 139 and probably as late as 161. But little is known of his personal life, although he was the most distinguished scientist of his day and a voluminous writer. His *Almagest* was the authority and textbook on astronomy until the middle of the 15th century and his *Geography* occupied a similar place in its line until the discoveries of the 15th and 16th centuries revealed its errors. The *Almagest* contains the Ptolemaic System of astronomy (See Ptolemaic System) and gives much information which the author obtained largely from his predecessors. His geography gave the loca-

tion of many places and contained a map of the world as then known, as well as the method of locating places by their latitude and longitude. The rise of Copernicus brought the universal sway of Ptolemy's systems of astronomy and geography to an end. See ASTRONOMY; PTOLEMAIC SYSTEM; SOLAR SYSTEM.

Ptomaine, *To' ma in,* **Poisoning** is caused by eating certain foods which chemical changes have rendered unfit for use. Ptomaines are present in many animal products which have undergone decomposition through such changes. Almost 200 ptomaines have been discovered. Among the chief sources of ptomaine poisoning are canned fish and other meats, and ice cream which has been allowed to stand for several hours in tin cans.

Pub'lic Lands. See LANDS, PUBLIC.

Puccini, *Poot che'nee,* **Giacomo** (1858-), an Italian operatic composer, born at Lucca of a family musically distinguished. He studied at the Milan Conservatory and afterwards produced several operas, some of which are of high rank and wide popularity among their kind. Among them are *La Bohème,* which brought the composer international reputation; *Madam Butterfly, La Tosca* and *Manon Lescaut.*

Puck, an important personage in English folk lore. He is also known as Robin Goodfellow. In Shakespeare's *Midsummer Night's Dream* he is chief of the fairies. He is noted for his mischief and also for his power to bestow favors upon those who treat him kindly.

Pudding *Pood' ing,* **Stone,** a name commonly used to designate conglomerate, a kind of sedimentary rock. It forms along pebbly beaches under action of the water, and is composed of rounded pebbles or larger stones cemented together by sand or other fine-grained rock substance. There are several varieties, as quartz conglomerate or limestone conglomerate, according to the character of the pebbles. Under certain geologic conditions, it may undergo change; the pebbles lose their original shape and become distorted and the rock passes into gneiss. Notable among conglomerate deposits are the copper-bearing beds of Michigan, and those of Pennsylvania, Massachusetts and the Transvaal, Africa. See GNEISS; SANDSTONE.

Pueblo, *Pweb' lo,* a tribe of North American Indians once ranging over Mexico, New Mexico and Arizona. They were discovered by the Spaniards and were subdued by Coronado in 1540. They resisted Spanish rule for over a century, but were forced to yield. The Pueblo Indians were not a warring tribe. They built permanent homes and engaged extensively in agriculture. Their basket work, earthenware and blankets reveal unusual skill in handicraft. Their houses were built of stone or adobe and were often large enough to accommodate several families. They were several stories high and entrance was gained by ladders from the roof, this method insuring against hostile attacks. Several of these houses were built up the sides of steep cliffs and resemble the constructions of the cliff dwellers, of whom the Pueblos are the supposed descendants.

The Pueblo Indians now live in villages in New Mexico and Arizona. Zuñi and the seven Moki villages are the most important of these. There are about 10,000 now living.

Pueblo, Colo., second largest city of the state and county seat of Pueblo Co., on the Arkansas River and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri Pacific, the Denver & Rio Grande and other railroads. The city has an altitude of about 4680 ft. above sea level and is situated in a fertile agricultural and stock-raising region. The city is one of the most important industrial centers west of the Missouri River and is known as the "Steel City" on account of its extensive iron and steel industries, the steel plant of the Colorado Fuel & Iron Company employing 5000 men. The city proper lies on both sides of the Arkansas River near its junction with Fountain Creek, and contains a number of extensive smelters producing gold, silver, lead, copper and zinc, the ores be-

ing shipped a considerable distance for refining. The Valley of the Arkansas yields abundant crops of small fruits, alfalfa, sugar beets, peaches and apples. The manufacturing establishments include foundries and machine shops, railroad car shops, fire-brick factories, packing houses and foodstuff factories, over one-half of the manufactured products of Colorado being produced in Pueblo.

The noteworthy buildings include one of the finest courthouses in the west, McClelland Library, beautiful City Hall, Loretto Academy, state insane hospital, St. Mary's and Minnequa hospitals, the Vail and Congress hotels, several high schools, public and parish schools, about 54 handsome churches, a Y. M. C. A., and a Mineral Palace containing a collection of all the minerals of the state. The city contains 330 acres in parks, and two beautiful lakes, Lake Clara and Lake Minnequa. The first railroad, the Denver & Rio Grande, came through in 1872. In 1887 Central Pueblo, Bessemer and North and South Pueblo were consolidated. A city charter was granted in 1870. Pueblo has the commission form of government. Population in 1920, 43,050.

Puff'ball", a fungus which grows close to the surface of the ground in spherical heads. When young, puffballs are edible and are much relished by mushroom epicures. As they grow older they turn dark, become dry and open in various ways to discharge their many tiny spores in a pufflike smoke. Many spend their lifetime under ground and only appear when about to scatter their spores. In some localities puffballs attain great size; the giant puffball has been known to attain a diameter of three feet and a weight of 47 lb. Puffballs spread by means of mycelium, or long fibers, which extend to great distances beneath the soil. Before the days of matches these threads were used as tinder to catch the spark from the flint; the spores were used to staunch the bleeding of a wound. Puffballs are known as smokeless balls, devil's snuff-boxes, etc. See FUNGUS; MUSHROOMS.

Puf'fin, a sea bird of the Auk Family having a high, compressed bill, which is ridged along the side, short legs and webbed feet. The common puffin of the North Atlantic Ocean is larger than the pigeon; the upper parts are glossy black and the under parts white. The feet are orange-red and the bill in breeding season is red, blue and yellow. The name Puffin Islands is given to a locality near Anglesea, on the cliffs of which these birds nest in large colonies. The puffin is also known as bottlenose, sea parrot and pope.

TUFTED PUFFIN. This species is common along the northern Pacific coast. The bird is about the size of a domestic pigeon; the upper parts are black and the under parts grayish. In breeding season the sides of the face are white and there is a long, yellowish, silky crest feather over each eye. The feet and end of the bill are bright red. The nest is made at the end of a burrow in the ground or in a natural cavity in a cliff. One white egg is laid.

Pug, a small mastiff, of use only as a pet. It is smooth-haired, has a broad chest, a short muzzle, wrinkled face and tightly curled tail. The most common species is fawn-colored, but the eyes and ears are generally black and some totally black pugs are found. Being used only as pets, they are likely to be fat, lazy and frequently irritable.

Puget, *Pu' jit,* **Sound,** an irregular inlet of the Pacific Ocean, deeply penetrating into the northwestern part of the State of Washington. Beginning at the junction of the straits of Georgia and Juan de Fuca, it soon divides into the two branches, Hood's Canal in the west and Admiralty Inlet in the east. On one of the irregular, branching fiords of the latter is situated Olympia, the state capital. The waters are cool, the Fraser and other rivers supplying melting snow. With a background of mountains it forms one of the most picturesque bodies of water, as well as one of the largest inland harbors, in the world. There are no shoals and in depth it ranges from 180 to 925 ft. The large

ocean traffic is supplied chiefly by Seattle, Tacoma and Port Townsend.

Pulas'ki, Casimir (Polish, Pulawski, Kasimierz) (1748-1779), a Polish soldier in the American Revolution, born in Podolia, Poland, of noble family. He was prominent in forming the Confederation of Bar and fought gallantly to free Poland from Russia, rising to the position of commander-in-chief of the Patriotic Party. In 1771 he was outlawed for alleged complication in a plot to abduct King Stanislas from Warsaw. His estates were confiscated and he escaped to Turkey, thence to France. Here Franklin and the French ministry persuaded him to fight for the colonies in America; in consequence, he arrived at Philadelphia in 1777 and offered his services as a volunteer. He fought at Brandywine and was made chief of dragoons with the rank of brigadier-general. He was present also at Germantown and at the engagements during the winter of 1777-1778. His independent corps of cavalry and light infantry, organized in 1778 with the permission of Congress and known as Pulaski's Legion, served well in the South, and successfully defended Charleston in May, 1779. Pulaski was mortally wounded in the attempt to recapture Savannah, Oct. 9, and died two days later on board the United States brig *Wasp*.

Pu'litzer, Joseph (1847-1911), an American journalist, born in Budapest, Hungary. While still a youth he came to America and soon made his way to St. Louis. Here he entered the journalistic field and became interested in politics. In 1869 he was elected to the Missouri Legislature; in 1872 he was chosen delegate to the convention which nominated Horace Greeley for the presidency; in 1874 he was sent to the Democratic National Convention; and in 1884 he was elected to Congress. After serving for a time as managing editor of the *Westliche Post*, he founded, in 1878, the St. Louis *Post-Dispatch*, and in 1883 he purchased the New York *World*, which under his control wielded a very great influence in public affairs. Finding his journalistic duties now considerably increased, he resigned his seat in Congress to devote his entire time to them. By the gift of $1,000,000, in 1903, Mr. Pulitzer founded a school of journalism at Columbia University.

Pul'ley, a simple machine consisting of a grooved wheel, which turns freely upon an axis, and a rope, which passes about the rim of the wheel. The axis and frame holding the pulley is called the block. If the axis is stationary the pulley is known as a fixed pulley; when the axis rises and falls with the weight, the pulley is a movable pulley. In every form of pulley a force applied at one end of the cord is transmitted through the entire length. In a fixed pulley the weight and "power" are equal, and the only advantage gained by its use is a change in the direction of the force. In a compound pulley the "weight" is equal to the "power" multiplied by the number of sections of sustaining rope. A compound pulley, or system of pulleys, consists of a fixed block containing one or more wheels, and a movable block containing an equal number of wheels with one rope passing successively round a wheel in one block, and then round one in the other till it has passed round all the wheels. Compound pulleys or a system of pulleys are of great advantage because by their use a small force can be made to lift a great weight. See DERRICK.

Pull'man, George Mortimer (1831-1897), inventor of the Pullman Sleeping Car, born in New York. At the age of 22 he was taking contracts to remove large buildings from the proposed line of the Erie Canal. In 1859 he settled in Chicago and engaged in the business—then new—of raising entire blocks of stone buildings without disturbing the occupants. Having observed the discomforts of railway travel, he constructed, in 1863, after several years of experimenting, a sleeping car upon the present model. It proved a success, and in 1867 he organized the Pullman Palace Car Company, which has become the largest car-building establishment in the world.

In 1887 he designed the system of "vestibuled trains." In 1880, in order to furnish increased shop facilities, and also to put into effect some long-cherished theories with regard to the social surroundings of the laboring man, he laid out, near Chicago, the town of Pullman. Among other public enterprises with which he was connected was the Metropolitan elevated railway system of New York.

Pulmotor, an apparatus for reviving asphyxiated persons. It consists of a cylinder containing oxygen under great pressure, a fixture for placing over the mouth and nostrils, and a pump for forcing oxygen into the lungs. When the mouthpiece is placed in position the pump is started and kept at work until respiration is restored. The pulmotor was invented in Germany and introduced into the United States in 1911. It is of inestimable value in cases of asphyxiation, since it can force oxygen into the lungs after the respiratory organs have ceased working, whereas the ordinary oxygen apparatus cannot be used under these conditions. Its use is successful in fully five-sixths of the cases which would otherwise prove fatal.

Pulque, *Pool' ka,* a vinous beverage made by fermenting the juice of various species of the agave, chiefly the maguey, or century plant. It resembles milk in appearance, tastes like a mixture of milk and sour beer, and possesses an unpleasant odor. After protracted fermentation pulque becomes intoxicating. It is made in various countries of Spanish America, especially in Mexico. See AGAVE.

Pulse, the rhythmic expansion and contraction of the arteries, due to the waves of blood poured into them with successive beats of the heart. The movement begins in the left ventricle of the heart, whose contraction forces its contents into the aorta. This artery contracts upon it, pushing it along its passage with alternate contractions and expansions, causing an intermittent beat, which can be felt in the arteries of the wrists, neck and temples. The normal pulse beat in adults is from 65 to 75 a minute. In youth it is faster than in old age. There is no pulse in capillaries or veins. See HEART; BLOOD; ARTERIES.

Pu'ma, or Cougar, *Koo' gar,* a large Western member of the Cat Family, which has the farthest north and south range of any land animal. The adult puma is blue-gray, with a reddish tinge, caused by each hair being tipped with red. The lips, the rim of the ear, and the tip of the tail are black; the throat, the sides of the muzzle, the inside of the legs, and the belly are white. In the young the body is spotted, but these spots disappear after about six months. The puma has a round head, pointed ears, a thick body and a long tail. It is catlike in appearance and has received the name mountain lion from its resemblance to the lioness, for which it was at first mistaken. The names panther, painter and cougar are also applied.

The home of the puma is generally a sheltered, or nearly inaccessible, cave, which it reaches by a leap of too great distance for other animals to follow; in the flat Southern lands it makes its lair in a dense thicket or canebrake. Pumas are especially troublesome to ranchmen, for they prey by night, killing sheep by hundreds and carrying away goats, pigs, calves and smaller animals; they even attack horses and cattle. Because of its quietness in hunting, its long spring and its certain aim, the puma has been much feared; its catlike trait of fear of a dog is strongly marked, for the smallest cur can drive a large puma up a tree. The puma rarely utters a cry except during the mating season, when it wanders through the woods startling man and beast with its mournful howl.

Pumice, *Pum' is,* **Stone,** a light mineral substance of volcanic origin, full of pores like a sponge. Pumice stone is extensively employed for polishing wood, ivory, glass, marble, metals and leather, and as an abrasive in soaps to increase their scouring qualities. Great quantities of pumice are exported from the Lipari Islands, and it is also obtained from Iceland and the volcanic regions of America.

Pump, a device for raising, exhausting, compressing or circulating fluids and gases by drawing or forcing them through apertures or pipes. Many forms of pumps have been designed, each differing in construction according to the purpose for which it was intended. The simplest forms of pumps are the lift pump, or suction pump, shown in figure 1, and the force pump, shown in figure 2. The suction pump is designed to lift liquids subject only to the pressure of the atmosphere. Figure 1 shows a close-fitting plunger, which is caused to move up and down in the pump barrel (5); 1 and 3 are valves opening upward. When the plunger moves upward, the weight of the fluid on the valve 3 keeps it closed, while the mass is being lifted and discharged through the orifice at 6. At the same time the valve 1, which is acted on from below by the pressure of the air diminished by the pressure due to the weight of the column of the liquid, will be forced open, allowing the portion of the barrel below the plunger to fill. On the down stroke of the plunger, the valve 3 opens, equalizing the pressure above and below, while the valve 1 is closed by the weight of the liquid; 4 is the rod connecting the plunger with the handle. Theoretically a lift pump should lift water about 34 ft., this being the height of a column of water which the air under ordinary conditions will sustain, or a pressure equal to that of the atmosphere, say 15 lb. to the square inch, but by reason of frictional losses, this form of pump lifts but from 25 to 27 ft. effectively. However, when drawing water from deep wells, it is customary to put the pump barrel, with its piston, down near the water or into it, and force the water up, this attachment being known as a deep-well pump.

The operation of the force pump may be understood from figure 2, in which 1 is a solid piston without valves; 2 is a valve which is raised during the upward stroke by the pressure of the air on the surface of the water (6), a short distance below; 3 is a valve opening during the downward stroke to admit the liquid to the chamber (4), whence it is forced out through the discharge pipe (5) by the pressure of the air confined within the upper part of the chamber.

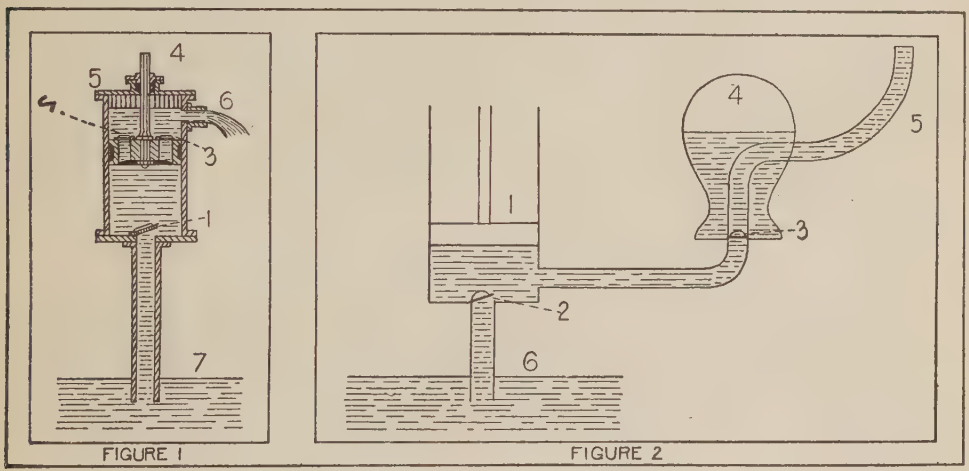

FIGURE 1 FIGURE 2

LIFTING AND FORCE PUMPS

The chain pump is used quite extensively where there is an abundant supply of water near the surface. It usually consists of an endless chain carrying knobs or cups, which pass over two grooved iron wheels, one at the bottom

of the well and the other at the surface, supplied with a set of gearing and a crank. As the crank is turned the chain is put in motion, and the little knobs on the chain draw up the water through a pipe, the velocity of the chain being sufficient to keep the water from spilling backwards.

Centrifugal pumps are generally constructed with a view to capacity alone, having but little lifting or forcing efficiency. They consist of a wheel having three or more vanes or wings fitted to a shaft and operated within a shell or casing provided with suction and discharge pipes. The rapid rotation of the vanes causes a partial vacuum within the casing, and the water by atmospheric pressure rushes in to fill this void, while the centrifugal action of the vanes forces the water out. See AIR PUMP; AIR COMPRESSOR; HYDRAULIC RAM.

Pump'kin, a garden vine of the Gourd Family bearing a large fruit of the same name. It is generally planted in cornfields, where its long, tendril-bearing stems creep along the ground at great length. These stems are thick and hairy, with watery juice and long, tough fibers. The leaves are large and coarse, generally lobed and in outline much like the palm of the hand. The flowers, growing in the axils of the leaves, are large, orange-yellow blossoms, trumpet-like in form and five-parted at the margins. These are set in a green bell-shaped cup, or calyx. The stamens are long, extending from the base of the cup to the top of the spreading lobes. The fruit is large and globular, being fleshy within and coated with a firm rind. This is the familiar pumpkin known for its use in pies.

It is said that pumpkins were cultivated by the Indians long before the coming of white men and, with Indian corn, were among the first new crops which the colonists learned to raise. This would, no doubt, account for the pumpkin's time-honored association with colonial feasts and Thanksgiving festivities.

Punch, a famous English weekly, comic in character. The first number appeared on July 17, 1841, with Mark Lemon as editor. A number of famous men have been its contributors and illustrators, among whom are Thackeray, Tom Hood, Shirley Brooks, Artemus Ward, H. K. Browne ("Phiz") and Sir John Millais. *Punch* satirizes fads, shams and affectations unsparingly and is without bias in dealing with politics.

Punctuation, *Punk" tchu a' shun,* the use of specified marks, in printing and in writing, to separate sentences and parts of sentences. The object of the use of these marks, or points, is to indicate the grouping of words and their relationships, thus to make their meaning more easily apparent. The Greek and Roman manuscripts contained no such marks and a correct reading of them was often attended with great difficulty. Near the end of the fourth century B. C. arbitrary signs were introduced to indicate pauses, but the present system of punctuation owes its origin to the 16th century, when Aldus Manutius, a Venetian, laid down principles for the points now in use. The marks have remained much the same, although their usage varies slightly in different countries and the rules governing their use are frequently subject to change. The marks in vogue at the present day are: period (.), comma (,), semicolon (;), colon (:), dash (—), interrogation point (?), exclamation mark (!) and the parenthesis (()). The use of these marks is explained in treatises on punctuation. Consult Bigelow's *Handbook of Punctuation.*

Pu'nic Wars, a series of wars waged between ancient Carthage and Rome from 264 to 146 B. C. The indirect cause of this struggle was the jealousy existing between the two great rivals. By 275 B. C. Rome had become protector of all Italy, and it was incumbent upon her not to allow the neighboring Island of Sicily to fall into the hands of a foreign power. Carthage, however, had long desired to conquer Sicily, thus completing the chain of island posts by

which she controlled the western Mediterranean.

First Punic War (264-241 B. C.). Disturbances in the city of Messana, commanding the straits between Italy and Sicily, caused the outbreak of the first war. In 264 B. C. a band of mercenaries, who had established themselves in the town, was hard pressed by Hiero II, ruler of Syracuse, and two factions applied respectively to Rome and Carthage for aid. The Carthaginians responded first, occupied the city and pacified Hiero. When the Romans arrived their commander led troops into the city and induced the Carthaginian leader to withdraw his garrison. A declaration of war from Carthage followed. The first operations in Sicily led to no definite results, and in 260 B. C. the Romans built and equipped their first large fleet of standard battleships. At Mylæ, off the north Sicilian coast, Caius Duilius, the Roman admiral, defeated the Carthaginians; Rome had become a sea power.

In 256 B. C. the Romans invaded Africa and won brilliant successes under their consul Regulus, but still without permanent results. In 254 B. C. they resumed operations on the sea, where severe reverses caused the loss of four great fleets. The Senate was about to abandon the struggle on sea when, by the generous gifts of private citizens, 200 vessels were built and equipped. In 241 B. C. this fleet won a decisive victory off the Ægusæ Islands, giving Rome undisputed command of the sea. Carthage now sued for peace, to obtain which she paid a heavy war indemnity and withdrew from Sicily and the Lipari Islands.

In the interval between the First and Second Punic wars, Rome acquired Sardinia and Corsica by methods which induced Carthage to prepare for a renewal of the struggle. A valiant champion was found in Hamilcar Barca, who endeavored to offset the loss of Sicily by extending Carthaginian dominion over Spain. His work was continued by his son-in-law Hasdrubal and his son Hannibal. The latter, one of the world's greatest generals, organized the southern part of Spain as a Carthaginian province, extended the Carthaginian frontier to the Ebro, and besieged Saguntum, an ancient Greek colony near the east coast. Saguntum appealed to Rome, and the latter country declared war when Carthage refused to recall Hannibal. See Hannibal.

Second Punic War (218-202 B. C.). Hannibal at once took the offensive and in five months had crossed the Pyrenees and the Rhône and appeared in Cisalpine Gaul. He defeated Roman armies at the Ticinus, at the Trebia and near Lake Trasimene, and then devastated Italy. Quintus Fabius Maximus (the Laggard) prevented his securing a permanent base of operations by adopting tactics of delay, but the impatient leaders at Rome clamored for more decisive measures. A huge army of 90,000 men was put on the field, and at Cannæ, in 216 B. C., it was overwhelmingly crushed. Undaunted, Rome refused to consider proposals of peace. Moreover, Hannibal was unsuccessful in winning to his cause the subject towns of Rome in Italy. The policy of Fabius was again adopted, and for 13 years Hannibal maintained himself in Italy, winning occasional battles, but without gaining any permanent advantage.

Meanwhile Hasdrubal, Hannibal's brother, had been contending against the Romans in Spain. In 208 B. C. he started to reinforce Hannibal, but the Romans, learning of his plan, intercepted him at the Metaurus and crushed his army. Rome now carried the war into Africa. In 202 B. C. Hannibal was recalled to Carthage to defend the city from the Roman army under Scipio, and at Zama, a village to the south of Carthage, received his first and only defeat. The war was now at an end. Carthage ceded Spain and the islands of the western Mediterranean; surrendered her war elephants and all her ships of war except ten; paid a huge war indemnity; and became a dependent ally of Rome, with the provision that no war should be waged without Roman consent.

THIRD PUNIC WAR (146 B. C.). In the years following the second war, Carthage was constantly harassed by Massinissa, Prince of Numidia. Rome refused to listen to appeals for aid, while her envoys to Carthage brought back stories of the city's wealth and prosperity. The zealous Cato concluded every speech in the Senate with the phrase "Carthage must be destroyed." In despair, Carthage took up arms against Massinissa, and as this was a violation of the peace treaty, Rome declared war. A Roman fleet and army proceeded to Carthage, compelled the city to dismantle its walls, to strip its arsenal and to surrender all shipping. When the announcement came, however, that the city must be destroyed and the people be removed ten miles inland from the sea, the Carthaginians made a last heroic stand. Women gave their hair for catapults, arms were manufactured, and for four years the city resisted a terrible siege, surrendering in 146 B. C. For days it was given to pillage, then burned to the ground. The remnant of the ancient territory of Carthage became the Province of Africa.

Punxsutawney, *Punk" soo taw' ny,* **Pa.,** a city of Jefferson Co., 45 m. w. of Altoona, on the Mahoning Creek and on the Pennsylvania and the Buffalo, Rochester & Pittsburgh railroads. Coal and iron are found in the vicinity. The town has foundries, grist, planing and shingle mills and glass and tile works. The name was changed to Greater Punxsutawney in 1907 by the annexation of Clayville borough. Population in 1920, 10,311.

Pur'gatory, a place of suffering, where, as believed by Roman Catholics and others, penitent souls are completely purged from venial sin before entering heaven. Severity and length of sufferings in purgatory are in proportion to the nature and number of sins for which the soul must make reparation. According to St. Augustine, some of the torments of purgatory are "more terrible than all that man can suffer in this life," but it is believed that souls in purgatory are afforded relief by the prayers of the faithful on earth. All Souls' Day commemorates the poor souls in purgatory.

Pu'ritans, a name given about 1654 to those who wished to abolish or "purify" certain forms and abuses in the Church of England. While political and ecclesiastical in some of its aspects, Puritanism was primarily a religious temper and spirit. It represented a great moral change that passed over England during the reign of Queen Elizabeth and the years following. It began with the introduction of the Bible into the churches and homes of the people through the translations of Tyndale and Coverdale and the small Geneva Bibles. Up to that time almost no history or romance, and hardly any poetry was accessible to the average Englishman, and the Scriptures came with all the force of a new literature and a fresh revelation. Men and women hung entranced upon the eloquent voices of the prophets and the thrilling story of the evangelists. The language of the Bible entered into the speech of common life and its lofty ideas changed the ideals of society.

In its earlier stages the new movement was not harsh or opposed to the brighter phases of life, as witnessed by the youth and young manhood of John Milton, one of its best representatives (See MILTON, JOHN); but as Puritanism pressed its reforms, it was bitterly opposed by the established Church and persecuted by the State. Its sterner qualities then manifested themselves in a determined attempt to win civil and religious liberty. It was this contest that led to the Civil War; and it was this spirit that made Cromwell's army invincible, brought Charles I to the block and established the Commonwealth (See CROMWELL, OLIVER).

In ecclesiastical affairs Puritanism at first attempted no more than reform of abuses in the established Church, and had no quarrel with the supremacy of the king as head of the Church. As the hope of such reformation became faint, however, one element of Puritanism demanded the establishment of Presbyte-

rianism, to which the civil authorities should be subordinate, after the order of the Calvinistic city of Geneva (See CALVIN, JOHN); while another element, known as Independents, or Separatists, insisted upon the establishment of self-governing church communities, wholly independent of the State.

It was Puritans of the latter type who came to America in the *Mayflower* and landed at Plymouth in 1620 (See PILGRIMS). During the persecutions of the next 20 years more than 20,000 English refugees emigrated to the New World and established the Puritan commonwealths of New England. In England, Puritanism as a political movement failed with the return of Charles II in 1660. But in this failure its real victory was achieved. The wild orgies of the Restoration were on the surface. "The mass of Englishmen remained what Puritanism had made them, serious, earnest, sober in life and conduct, firm in the love of Protestantism and of freedom."

Pusey, *Pu' zy,* **Edward Bouverie** (1800-1882), a distinguished English clergyman and leader of the Oxford Movement, born at Pusey in Berkshire. He graduated at Oxford with honors in 1822, spent two years in Germany, and in 1828 became professor of Hebrew at Oxford, continuing in that position until his death. In 1835 Pusey became actively connected with John Keble and J. H. Newman in the Oxford Movement, of which he soon was the recognized leader, so that its adherents came to be known as "Puseyites" (See OXFORD MOVEMENT). As head of the High Church Party in England, he led the revival of pre-Reformation theology, and was the author of the practice of confession in the Church of England and of its doctrine of the Eucharist. For a quarter of a century he was the most influential person in the Anglican Church. His tracts, sermons and books represented prodigious labor and connected him with every important religious controversy of his day. Pusey was a man of warm affections and pure life, not fond of general society, a lover of books and his fellowmen, giving to charitable and benevolent objects to the limit of his means. He died at Oxford, where he was buried in the cathedral of which he had been for 54 years a canon, and a memorial building bears his name and houses his library.

Put'nam, Israel (1718-1790), an American soldier, born at Salem Village (Danvers), Mass. He removed to Connecticut in 1740 and served throughout the French and Indian War, during which he rose to the rank of major, and in which he was tortured as an Indian prisoner. He was active in all pre-Revolutionary disturbances, and on hearing of the battles of Lexington and Concord, left his plow to join the American forces at Cambridge. He fought at Bunker Hill; but in May preceding that battle destroyed considerable British shipping while leading a battalion against Noddle's Island. In 1775 he commanded on Long Island, and the following year was with Washington in New Jersey, fighting at Princeton. In 1777 Putnam was given command in the Highlands of New York, where he evacuated forts Montgomery and Clinton. This caused him to be superseded; but being acquitted of all charges upon investigation, he was later reinstated. While engaged with the fortification of West Point, he was disabled by a stroke of paralysis, December, 1779. Putnam was a valiant patriot and the idol of his soldiers, and is a popular hero of American history, but he possessed little ability as a military commander.

Putnam, Rufus (1738-1824), an American soldier and frontiersman, born in Massachusetts. He served in the last French and Indian War and in the Revolution, after which he became brigadier-general. In 1786 he helped organize a company of Revolutionary veterans to settle Ohio, being a director of the Ohio Company. Two years later he established the town of Marietta. He was influential in securing the passage of the Ordinance of 1787. He became surveyor-general of the United States in 1796. Bar-

ring Lafayette, Putnam was the last surviving general officer of the Revolution. See ORDINANCE OF 1787.

Pu"trefac'tion, the decomposition of organic substances which is brought about by means of bacteria or some ferment, and which produces offensive gases. The gases are formed by the breaking up of compounds which contain nitrogen and sulphur and are generally ammonia, marsh gas and hydrogen sulphide, although these products vary according to the substance which is decaying. In the decay of animal bodies, certain compounds called ptomaines are produced, which are often the cause of serious poisoning.

Puvis de Chavannes, *Pu" ve' de Sha" van',* **Pierre** (1824-1898), one of the greatest mural decorators of the 19th century, born at Lyons. In painting he was chiefly self-taught, but studied with profit the works of the early Florentines, especially Giotto's. With him mural painting again became what it had been with the early Italians—decoration; that is, a part of, and in perfect harmony with, the building in which it was placed. His composition is in two dimensions, broadly treated; the color is in a light key; the modeling of the figures is accomplished, as in Japanese art, with line rather than with shadow, all of which produces a flat effect, thus accentuating the two essential features of the wall—flatness and extent. The picture partakes of the nature of the wall and becomes a part of it. Puvis's greatest works are in the Sorbonne, the Hôtel de Ville at Paris and in the museum at Amiens. One of his surfaces is in the Boston Public Library, *The Muses Saluting the Spirit of Enlightenment.*

Pygmalion, *Pig ma' li on,* in Greek myths, a sculptor of Cyprus, who fashioned from ivory a maiden of such beauty that he fell in love with it. In answer to his prayer, Venus gave the statue life, and, as Galatea, she became the wife of Pygmalion.

Pygmies, *Pig' miz,* a race of dwarfs dwelling in the equatorial regions of Africa west of Uganda. They are under five feet in height. They have brown skins but belong to the negroid type of the black race. These dwarfs were discovered by Stanley. They live in the forest in small communities, usually under the protection of tribes of larger people. Pygmies are also found among the Malays in the islands of the South Pacific.

Pyle, *Pile,* **Howard** (1853-1911), an American illustrator and author, born in Wilmington, Del., and educated in New York City and Philadelphia. After much discouraging effort he gained recognition by his illustration *Wreck in the Offing,* and later achieved real distinction in the field of illustrative work for children. His illustrations are characterized by sincerity, freshness of imagination, and originality of design, line and color. His personality and ability were the source of inspiration for a group of fellow students and pupils, though he never established a school. He was the author and illustrator of *Merry Adventures of Robin Hood, Pepper and Salt, A Modern Aladdin, Twilight Land* and others.

Pym, John (1584-1643), an English statesman. He was a leader in the opposition to the tyranny of Charles I. A few days after the meeting of the Long Parliament he brought a charge of high treason against the Earl of Strafford, and was also zealous in exposing the faults of Charles's rule. At the outbreak of the Civil War, Pym directed the course of his party in Parliament and succeeded in forming an alliance with Scotland.

Pyramids, *Pir' a mids.* The Great Pyramids of Egypt are in a group at Gizeh, near Cairo, on the edge of the Libyan Desert, and they extend also to the south about 25 m. They are chiefly built of hard limestone quarried from the hills near by. On the outside are blocks of granite which were brought from great distances. These Pyramids were built about 3800 B. C. and were designed as tombs for the kings. The most famous of these structures are found in a group of nine on the site of the ancient city of Memphis. In this group stands

the Great Pyramid of Cheops, a king of the fourth dynasty. This is 756 ft. square at the base, and 480 ft. high. Although some of the material has been used to build temples and mosques at Cairo, it still covers 13 acres. The apex, once sharp, is now about three yards square. Some of the huge blocks used in the construction of this Pyramid weigh over 50 tons. Within are chambers and long passages. The Pyramid of Khafra is next in importance in this group. It covers 10 acres, rises to 448 ft. and has a base 700 ft. square. The third Pyramid is that of Menkaura, 212 ft. high, with a base 354 ft. square. This Pyramid is better constructed than the other two. About five miles northwest of Gizeh is another large Pyramid, and several groups have been found in Nubia.

Pyrenees, *Pir′ e neez,* a mountain chain of Europe. It extends from the Bay of Biscay to the Mediterranean Sea and separates the Iberian Peninsula from France. The main system is 280 m. long and has an area of 20,000 sq. m. It is an effective barrier to commerce, due to the scarcity of passes and the high elevation of those that do exist. The Col de la Perche and the Col de Somport are the only two practicable for carriages. There are two railroads between France and Spain, but they extend along the coast lines; hence the greater part of the traffic is by sea. The Central Pyrenees contain the highest peaks, and of these Maladetta rises to a height of 11,168 ft. The Pyrenees as a whole have neither the snow and ice nor the marvelous beauty and grandeur of the Alps, nor are they frequented by tourists to any great extent.

Pyrites, *Pi ri′ teez,* a group of metallic sulphides, usually iron disulphide. Iron pyrite crystallizes in cubes, has a brass-yellow color and a metallic luster. It is widely distributed, occurring in every kind of rock formation of every geological age. Iron pyrite is worked chiefly for the sulphur which it contains, its chief products being sulphuric acid and ferrous sulphate. Pyritous shales have been largely used in the manufacture of alum. Copper pyrite consists mainly of copper with varying proportions of gold and silver. Spain is the largest producer of iron pyrite, and the United States also furnishes a large supply.

Pyrometer, *Pi rom′ e ter,* an instrument for measuring higher temperatures than can be measured by ordinary mercury thermometers. A common form consists of a hydrogen, gas or air thermometer having the hydrogen enclosed in a porcelain bulb that can be inserted into the place whose temperature it is desired to measure. Such instruments will measure temperature up to 1500° C. (See THERMOMETER). Other forms, called electrical pyrometers, depend upon the change in electrical resistance of a platinum wire when heated, or upon the production of a thermoelectric current when one junction of two metals, such as platinum and rhodium, is heated. In both forms the parts to be heated are enclosed in porcelain bulbs, and connecting wires are brought out to the necessary electrical measuring instruments. Such pyrometers can also measure temperatures up to 1500° C.

For measuring still higher temperatures, radiation pyrometers are used. These depend upon the heating power of the radiation from the hot body, as molten metal or the interior of a furnace, and are so devised that they may be used at a considerable distance from the body whose temperature it is desired to measure. There is practically no limit to the temperature that can be measured by such instruments, 3000° C. to 5000° C. being readily measured with a fair degree of accuracy.

Pyrotechny, *Pi′ ro tek″ ny.* See FIREWORKS.

Pyroxene, *Pi′ rox een,* or **Augite,** *Aw′ jite,* a name applied to a group of minerals composed chiefly of silica, calcium and magnesium, frequently combined with iron and sometimes with manganese and zinc. Pyroxene is brittle, usually crystalline, though sometimes granular, with a glassy or resinous luster and commonly dull green in color; but it may be either colorless or brown-

ish-black. It is one of the most important of rock-forming minerals, and is found in all parts of the world, commonly in crystalline limestone or dolomite, in serpentine and in rocks of volcanic origin; it sometimes occurs in granite rocks and metamorphic schists. With labradorite and magnetite it forms basalt.

Pyrrhus, *Pir' us,* (about 318-272 B. C.), a King of Epirus and one of the ablest generals of antiquity. He was placed on the throne at 12 years of age, but lost his kingdom in a few years. He took a prominent part in the Battle of Ipsus, and soon after this regained possession of his kingdom. He conquered and gained possession of the western part of Macedonia. In 287 B. C. the kingdom was divided between Pyrrhus and Lysimachus. In 281 B. C. he assisted the Greeks against the Romans and won a signal victory. He then marched northward to attack Rome, but found the city so strongly fortified that he returned to Tarentum. He won two other battles, but his success was of no permanent value. He then went to Sicily and conducted a brilliant campaign against the Carthaginians. In 275 B. C. he returned to Italy and met the Romans at Beneventum, where he was totally defeated. In 272 B. C. he led a force into the Peloponnesus, where he was slain.

Pythagoras, *Pi thag' o ras,* a famous Greek philosopher living in the sixth century B. C., born at Samos. After receiving instruction in his native city he studied in other places, notably in Egypt, where he remained for 22 years, and then in Babylon and as far east as India. Having thus been initiated into the Greek, Egyptian and Chaldean mysteries, he spent the later years of his life in Magna Græcia in southern Italy. Here he founded a society whose members bound themselves to friendship, purity and chastity, and to cooperation in maintaining morality and order in the community. This society was apparently a semireligious and semiphilosophical cult, dominated in part, also, by political purposes. Pythagoras left no writings, and the doctrines of Pythagoreanism are probably to a large extent those of his later disciples. He succeeded the early Ionian philosophers, and, like them, sought for the first principle of nature. This he found, not in some material element, as they had done, but in form, proportion and harmony, all of which in turn he reduced to number, which he made of the final principle of all things. The transmigration of souls was one of his doctrines.

Pythias, *Pith' i as,* Knights of. See KNIGHTS OF PYTHIAS.

Py'thon, a name applied to a large family of nonvenomous serpents, all but one species of which are found in the Old World. The pythons are among the largest serpents, attaining sometimes a length of 30 ft. but generally averaging between 20 and 25 ft. Their color is a beautiful pattern of intermingled black, brown and gold. Their method of feeding is peculiar, for they eat an enormous meal, then for two days lie half in the water and half upon land, bathing and digesting their food. The largest pythons are said to be able to swallow antelopes of the smaller species. In general, all serpents of this family are commonly called pythons. They kill their prey by crushing it. See SERPENT.

Pyxie, *Pix' y,* or **Flowering Moss,** a low, creeping shrub of the Diapensia Family, found in eastern United States blooming with the arbutus before the majority of the flowers are even in bud. The branching stems are covered thickly with little, narrow leaves which cluster closer at the ends of the stems and near the flowers. The blossoms may well be considered the blossoms of the pyxies, for the tiny pink lobes of the petals, bearing between them the pillowlike stamens, would seem to be fit resting places for elves and fairies. The lobes of the petals, five in number, are broad and wide-spreading, and as they lie upon the creeping, leafy branches have the appearance of a moss suddenly sprung into blossom. Pyxie is most abundantly found in New Jersey, Virginia and North Carolina.

Q

QUADRANT, *Kwod' rant,* an astronomical instrument similar to the sextant. It consists of the arc of a circle equal to a fourth part of the circumference and graduated into degrees, minutes and seconds. It was formerly used in taking angular measurements. See SEXTANT.

Quadrumana, *Kwod ru' ma na,* a name once given to an order of Mammals and including all families of apes, monkeys and lemurs. The term referred to the fact that all four limbs were fitted for grasping and were, therefore, handlike. In distinction to this order, man was classed in a separate division, known as Bimana, or two-handed. The two divisions are now united in the single order Primates.

Quæstor, *Kwes' tor,* treasurer of state in ancient Rome. The quæstor who remained at Rome had charge of the revenues and public expenditures. The military quæstors were assistants of the magistrates of the provinces. They attended to the payment and provisioning of the troops, collected the imposts and took the place of the magistrate when he was absent. The holder of this office was entitled to a seat in the Senate.

Quagga, *Kwag' a,* a member of the Horse Family, closely related to the zebra and often confused with it. Its coat has a darker background and less plainly marked stripes. This animal, like the zebra, is a native of South Africa. The last one was killed in 1875 and so the species was exterminated. The name quagga was given by the natives in imitation of its barking neigh.

Quail, a family of small game birds, including the quail, partridge and grouse. They all have short wings, well-developed feet and the tarsus free from feathers. They nest upon the ground and the number of eggs varies from 2 to 18. The common quail of Europe, for which the family is named, is found in nearly all parts of the Continent, but is most frequently seen in the region of the Mediterranean. Several species are found in Asia, and the Chinese quail, found in China, is about four inches long. In the United States the quail is known as bobwhite in the North and as the partridge in the South. See BOBWHITE; GROUSE; PARTRIDGE.

Quakers, *Kwa' kers.* See FRIENDS.

Quarantine, *Kwor' an teen,* a term formerly used to designate the period of 40 days during which a ship from a port suspected of contagious disease was forbidden to land freight or passengers. The term is now applied to the rules and regulations adopted by government for the purpose of preventing the spread of contagious diseases within certain geographical boundaries. In the United States quarantine stations have been established at various points, and the owner, captain or pilot of any boat is required to observe the laws pertaining to them. Violations of such laws are punishable with fine. Ships under quarantine are forced to show a white light at night and a yellow flag during the day. There are also regulations governing intercourse in the interior. An entire family or a whole town may be under quarantine, and persons be forbidden freedom of movement during the course of the disease which caused the quarantine to be imposed. Thorough disinfection must precede the lifting of a quarantine.

Quart, a measure of capacity in the English system of weights and measures. As a unit of dry capacity the quart contains 67.20 cubic inches and is equivalent to 1.1012 liters; as a unit of liquid measure it contains 57.75 cubic inches and is equivalent to .94636 liter. Each quart is divided into two pints, dry pints and liquid pints, respectively.

Quar'termas"ter, in the navy a petty officer having charge of the steering of the vessel. He also keeps a lookout for other vessels, land, etc. In the army the quartermaster is a commissioned officer having charge of transportation, clothing, forage, munitions and general supplies. When on the regimental staff he is appointed from among the captains. See ARMY, UNITED STATES.

Quartz, a widely distributed mineral composed of silica or silicon dioxide. It is a common constituent of igneous rock, occurring also in veins and in separate masses. It is very hard, easily electrified by friction, and when free from impurities, transparent and colorless. The species includes two important groups, those that are crystallized and have a glasslike luster and those that are flintlike and massive. Quartz crystals are in the form of six-sided prisms terminating in pyramids of six faces. The former group includes rock crystal, amethyst, smoky quartz, cat's eye, rose quartz and milky quartz. In the latter group are chalcedony, carnelian, chrysoprase, plasma, agate, onyx, sardonyx, flint, hornstone, jasper and touchstone. Rock crystal is sometimes cut into gems, known as Lake George diamonds and Brazilian pebbles. It is used for spectacle lenses, test tubes, spectrum tubes and other laboratory and physical apparatus. Common milky quartz is used as a flux in smelting iron and copper ores, for making porcelain glazes and in the manufacture of glass, sandpaper and scouring soap.

Quassia, *Kwosh' i a,* a genus of tropical trees and shrubs found in South American and belonging to the order Simarubaceæ. The species best known is a native of northern Brazil. It is a shrub from 10 to 15 ft. high and has large pinnate leaves and racemes of bright red flowers. The wood, especially that of the root, is very bitter and is sometimes used in medicine.

Quay, *Kway,* **Matthew Stanley** (1833-1904), a United States senator, born in Pennsylvania. Having graduated at Jefferson College in 1850, he studied law at Pittsburgh and was admitted to the bar in 1854. The following year he was appointed to a county office, which he resigned in 1861 to accept a lieutenancy in the Tenth Pennsylvania Reserves. He served through the Civil War, after which he became conspicuous in Pennsylvania politics. From 1865 to 1867 he was a member of the State Legislature; from 1873 to 1878, and again from 1879 to 1882, he was secretary of state; in 1878 he was appointed recorder of Philadelphia; and in 1885 he was elected state treasurer by an overwhelming vote. In 1887 he became a member of the United States Senate, a position which he filled until 1899, when he was tried for using public funds for private purposes. He was acquitted, reappointed to the Senate by Governor Stone, and reelected by the Legislature in 1901.

Quayle, *Kwale,* **William Alfred** (1860-), an author and a clergyman of the Methodist Episcopal Church, born in Parkville, Mo., and educated at Baker University. He was ordained in 1886 and was successively a tutor, adjunct professor of ancient languages and president at Baker University. After 1894 he held pastorates in Kansas City, Indianapolis and at St. James, Chicago, and in 1908 he was made a bishop. He is widely known as an eloquent and versatile lecturer. Dr. Quayle has written *The Blessed Life, In God's Out-of-Doors, Eternity in the Heart, God's Calendar, The Book of Ruth* and *The Song of Songs.*

Quebec, *Kwe bek',* a province of the Dominion of Canada, bounded on the n. by Hudson Strait, on the e. by Labrador, on the s. by the Gulf of St. Lawrence, New Brunswick, the United States and Ontario and on the w. by Ontario, James Bay and Hudson Bay. The southern boundary between Quebec and Ontario is formed by the Ottawa River. The province includes Anticosti, the Bird Islands and the Magdalen Islands in the Gulf of St. Lawrence. The greatest extent from east to west is 1350 m.; the width varies from 150 m. in the east to 1500 m. in the west; the area is about

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706,804 sq. m., of which 10,117 sq. m. are water. It is the largest province in area in the Dominion, and about three and a half times the size of California and Ohio, six times the size of the United Kingdom and larger than Austria-Hungary, France and Germany combined. Population in 1911, 2,005,305.

SURFACE. The surface is most easily studied by considering it under the three divisions into which the province is divided. These are the Laurentian Highlands, the Valley of the St. Lawrence and the region of the Notre Dame Mountains. The Laurentian Highland region lies north of the St. Lawrence. The highest elevations found along the St. Lawrence and Saguenay rivers are frequently known as the Laurentian Mountains. The region is, however, a plateau, varying in altitude from 1000 to 2000 ft. There are high bluffs along the river and on the Labrador coast, where the highest elevations are 6000 ft. From these the surface gradually slopes to the northwest. In general, the surface is uneven and hummocky. Nearly all this region is heavily timbered. The Valley of the St. Lawrence comprises a level tract of land lying on both sides of the river and extending from a point a little below the city of Quebec to the western boundary. It is wedge-shaped, with the apex of the wedge at the east end. It is bounded on the north by the Laurentian Plateau and on the south by the Notre Dame Mountains. The land is almost perfectly level, but south of the river the plain is broken by several detached peaks, which vary in altitude from 500 to 1600 ft., and in the river itself by Mt. Royal, around whose base clusters the city of Montreal. By some authorities these peaks are considered to be extinct volcanoes. Throughout this region the soil is of remarkable fertility, and it is the garden of the province, containing the best farms and the densest population. The Notre Dame Mountain region occupies the southeastern part of the province. Its leading characteristics is the range of hills or low mountains extending across it from the southwest to the northeast. They are a continuation of the Green Mountains in Vermont and reach their highest altitude in Sutton Mountain (3100 ft.). To the southeast of this range the country is rolling, well watered and fertile and constitutes an excellent farming section.

RIVERS AND LAKES. Quebec has more large rivers than any other province of the Dominion. The St. Lawrence, with its broad estuary extending inland as far as Quebec, is the most important river of Canada and one of the great rivers of the world (See SAINT LAWRENCE RIVER AND GULF). Its most important tributaries from the north are the Ottawa, the St. Maurice, the Batiscan, the Ste. Anne, the Montmorency and the Saguenay, and from the south the Richelieu and the St. Francis. The tributaries from the north either reach the main stream through deeply-worn channels, like the Saguenay (See SAGUENAY RIVER), or make a rapid descent over the bluff of the Laurentian Plateau, forming beautiful cascades. Some of the most noted of these are the Falls of Shawenegan on the St. Maurice, 150 ft. high, the Chaudière Falls on the Chaudière River, 125 ft. high, and the Falls of Montmorency, 250 ft. high. Other streams worthy of mention are the Yamaska, Echemin, L'Assomption and Bécancour. There are many small lakes in the Laurentian Plateau and a few of considerable size. Of these, Lake St. John, the source of the Saguenay River, and having an area of 360 sq. m., is the most widely known. Lake Timiscaming has an area of 125 sq. m. Lake Memphremagog, partly in Vermont, is noted for its beautiful scenery. Lakes Matapedia and Megantic are also worthy of mention.

CLIMATE. The climate varies in different sections. Along the Gulf of St. Lawrence and near the sea it is more even than farther inland, and in the northern part the mean annual temperature is from 10° to 12° lower than in the southern. The mean temperature at Montreal is 66° for the summer and 14°

for the winter. In general, the winters are long and cold and the summers short and hot. The snowfall over most of the province is heavy, but during winter there are many sunshiny days and the atmosphere is dry and bracing. The autumn is the most pleasant season. The annual rainfall varies in different localities from 21 to about 42 inches. It is sufficient everywhere for agriculture.

Minerals and Mining. Iron, copper, lead, asbestos and granite and limestone occur south of the St. Lawrence River, and in the Eastern Townships copper has been mined for a long time, the principal mines being near Sherbrooke. This region is also the chief source of asbestos for the markets of the world. The Thetford mines are the largest, and mining asbestos is one of the leading industries of the locality. Granite and limestone are quarried in several localities.

Forests and Lumbering. Quebec contains over 150,000 sq. m. of forests which have not been depleted. Most of this great forest area lies north of the St. Lawrence. The northern forests consist chiefly of pine, spruce and fir, and in those farther south the maple, basswood, poplar and spruce are more common. Lumbering and the manufacture of lumber products, including wood pulp, constitute the second industry in importance in the province. The yearly output of all lumber industries is valued at $20,000,000.

Agriculture. The level plain south of the St. Lawrence and the region known as the Eastern Townships contain some of the most fertile land in America. A large area north of the river is also an excellent farming country. All the cereals are grown, but oats constitute the leading crop. Large quantities of hay are raised and in many regions fruit is successfully cultivated, the entire fruit product ranking next to that of Ontario. Dairying is fostered by both the Dominion and the provincial governments and is a very important branch of agriculture. Quebec has more creameries than any other province of Canada and her annual output of butter is valued at about $10,000,000. The output of cheese is worth about $7,000,000. Over 10,000 acres are planted to tobacco each season, and in the Eastern Townships some maple sugar is made.

In the Valley of the St. Lawrence, which is occupied by the French, the farms are rectangular, generally a mile long and 30 rods wide. The roads are two miles apart and parallel to each other, with occasional crossroads. There is usually a house on every farm, and these dwellings are so near each other that many country roads for miles bear close resemblance to a village street. In the Eastern Townships both farms and counties have irregular boundaries similar to those in the New England States. In the northern part of the province there are large areas of public lands still open to settlement. The construction of the Grand Trunk Pacific Railway has made a large part of this region readily accessible. See Lands, Public, subhead *Canada.*

Manufactures. Quebec is abundantly supplied with water power, timber and good transportation facilities, all conditions favorable to manufacturing enterprises. It is now the second manufacturing province. The chief manufactories are engaged in the production of lumber, furniture, wood pulp and other lumber products. Tanning is an important industry. Montreal is the chief manufacturing center. The city has a number of large sugar refineries, factories for the manufacture of boots and shoes, cotton and woolen goods, large foundries and machine shops and a large number of other industrial establishments. There are also numerous manufactories in the smaller cities.

Other Industries. The inhabitants along the Gulf of St. Lawrence are engaged in fishing, from which they derive a good income. The great forests in the north are the haunts of many fur-bearing animals, from which much of the world's supply of fur is obtained. In this region hunting and trapping is a paying occupation.

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Transportation and Communication. The St. Lawrence River is navigable for ocean steamers to Montreal and is the great waterway of the province and the Dominion as well. By means of a canal around the rapids at Chambly the Richelieu is navigable its entire length and forms a waterway from Lake Champlain to the St. Lawrence. South of the St. Lawrence, the Grand Trunk and the Canadian Pacific railways with their branches furnish ample railway facilities. The Intercolonial extends from New Brunswick to Quebec along the south bank of the river to Montreal. North of the river and nearly parallel with it are branches of the Canadian Pacific and Canadian Northern railways, and running in a nearly western direction from Quebec City is the Grand Trunk Pacific, whose construction has opened a vast region to settlement. The telegraph and telephone are in general use throughout the settled portions of the province.

Inhabitants. About 80 per cent of the inhabitants are of French descent, and the rural communities in the Valley of the St. Lawrence are almost solidly French. Most of the English-speaking population is found in the larger cities, especially Montreal and in the Eastern Townships, but in the last-named section the French are gradually displacing the English settlers, who are disposed to move to the western provinces or to the cities.

Government. The chief executive is the lieutenant-governor, appointed by the governor-general of Canada for five years. He is assisted by an advisory council, consisting of heads of departments of the provincial government and appointed by himself. The Legislature consists of a Legislative Council of 24 members and an Assembly of 75 members. The judges are appointed by the Dominion Government for life.

Education. The elementary schools are administered by the council of public instruction, which is divided into two committees of the same number of members. One committee is Roman Catholic and the other Protestant. Each taxpayer is allowed to decide whether he wishes his tax to go to the Catholic or the Protestant schools, and, wherever required, separate schools are maintained for Roman Catholics and Protestants. There are also independent primary and secondary schools and others under denominational control. McGill University (undenominational) at Montreal is the leading educational institution of the province. Laval University (Roman Catholic) at Quebec, with a large branch at Montreal, is also of great importance. An agricultural school and a provincial normal school are located at Ste. Anne de Bellevue, both founded by Sir William Macdonald. There is also an Anglican University at Lennoxville.

Cities. The chief cities are Quebec, the capital; Montreal, Three Rivers, St. Hyacinthe, Hull, Valleyfield and Sherbrooke.

History. The province was first visited by Cartier, who explored the St. Lawrence River as far as Montreal in 1535. The first settlement was made at Quebec by Samuel Champlain in 1608 (See Champlain, Samuel de). The Jesuit missionaries soon followed and began to penetrate the interior and establish missionaries among the Indians. Their influence on the early history of the country was strong. Accompanying the missionaries and often going in advance were the French traders, who engaged in traffic with the Indians. The fur trade was very profitable and little attention was given to founding settlements or tilling the soil. Montreal was settled by Maisonneuve in 1642, on the site of the trading post established by Champlain in 1611. The country was in an unsettled condition and the population increased slowly until New France became British territory in 1763. Soon after this, Canada was divided into two provinces: Canada East, or Lower Canada, constituted what is now the Province of Quebec; and Canada West, or Upper Canada, constituted the Province of Ontario. These provinces were united in 1841 and continued under one government until 1867, when the Domin-

ion was formed. Since entering the Dominion the history of Quebec has been that of steady progress. Consult Parker's *Quebec: The Place and the People.*

Quebec, a city of Canada, capital of the province of the same name, situated on Cape Diamond, a promontory formed by the junction of the St. Lawrence and St. Charles rivers, and on the Canadian Pacific, Grand Trunk, Great Northern, Intercolonial and other railroads. It is 180 m. by river n.e. of Montreal and 430 m. n.e. of New York. Because of its location on the steep and rocky promontory it is popularly called the "Gibraltar of America." The cliffs along Cape Diamond, averaging 200 to 300 ft. in height, extend up the river for many miles; on the summit stands a citadel covering 40 acres and garrisoned by Canadian militia. The general appearance of the city is medieval, and its low, irregular line of buildings is quaint rather than imposing. It is divided into the upper and the lower town, access to the former, which is built on the bluff, being by several flights of steps, an elevator and steep, winding streets.

Streets, Parks and Boulevards. In the upper town the streets are wide, well paved and lighted, and in them, principally in Grande Allée, are some of the finest residences. Here also is the Dufferin Terrace, a splendid promenade 1400 ft. long, overlooking the St. Lawrence. A massive wall surrounds the portion of the town which extends toward the suburbs of St. Louis and St. John, and though the fortification is out of date the wall is practically intact. In the lower town the narrow and irregular streets present the quaint appearance of old French provincial towns. Among the parks and gardens is the governor's garden, overlooking the St. Lawrence and the Plains of Abraham, once the scene of the Battle of Quebec (See Quebec, Battle of), and now converted into a public park. In the suburbs are other places of picturesque and historic interest, and nine miles distant are the Falls of Montmorency, a cascade of great beauty, 275 ft. high.

Public Buildings, Institutions, Societies and Monuments. Among the public edifices are the Parliament and Departmental buildings, Hotel Frontenac, built after the model of an old French château, the city hall, the courthouse, the custom-house, the Basilica, Masonic Hall, the post office, the general hospital, the Jeffrey Hale Hospital and Hôtel Dieu Convent and Hospital. The educational institutions include Laval University, the largest Roman Catholic educational institution in Canada, the Ursuline Convent and the Convent of the Good Shepherd. Among organizations are the Literary and Historical Society, the Canadian Institute and the Y. M. C. A. The Advocate's Library and the Parliamentary Library have valuable collections of books and manuscripts. There are several monuments commemorating historical events; among others are those dedicated to Wolfe, Montcalm and Champlain.

Commerce and Industry. The harbor of Quebec accommodates the largest seagoing vessels, and with the Lorne graving-dock at Lévis, on the opposite shore, and the Louise basin, forms one of the best American harbors. It is closed by ice from the middle of December until the end of April. Steamers connect the city with other Canadian ports, as well as with Liverpool, Glasgow, London, Antwerp, Bermuda and the West Indies. There are ferry routes to Lévis, Sillery, St. Romuald and the Isle of Orleans. Quebec is the terminus for the large, fast passenger steamers. The chief export is timber, now shipped by rail but formerly brought in rafts floated down the river and collected in coves and fastened by booms along the banks. Adjoining Quebec along the river are large sawmills. The chief manufactures are machinery, iron castings, cutlery, leather, nails, rifles, gunpowder, boots and shoes, paper, musical instruments, ropes, India-rubber goods, steel and tobacco. The building of wooden ships was once one of the chief industries. The *Royal William,* the first vessel propelled by steam to cross the Atlantic, was built in 1831. This was

the beginning of the famous Cunard Line (See CUNARD, SIR SAMUEL).

GOVERNMENT AND HISTORY. Quebec sends three members to the Provincial Legislature and three to the Canadian House of Commons. It is governed by a mayor and council of aldermen, the term of office being two years with frequent reelections. Jacques Cartier was the first white man to visit Quebec. He came there in 1535 and found on the present site the large Indian village of Stadacona. Champlain established a trading post here in 1608 and called it Quebec. It was alternately in the hands of the English and the French, but it was considered a French stronghold until 1759, when it was captured by the English. In 1763 it was ceded to England by the Treaty of Paris. It was the capital of Canada in 1763-1841, in 1851-55 and in 1859-65. Among the heroes who died in defending or attacking this stronghold are Wolfe, Montcalm and Montgomery. Quebec is now second among the cities of Canada in military importance. English laws and government now prevail, but the French language and religion have remained unchanged, not over one-sixth of the inhabitants being English-speaking people. For historic interest and picturesque appearance, it has few rivals. Population in 1911, 78,190.

Quebec Act, the last of the five Intolerable Acts, passed by the British Parliament in 1774. Besides providing a government for the Province of Canada, it enlarged the Provinces of Quebec by adding to it the territory north of the Ohio and west of the Alleghenies, despite the fact that this land was claimed by Massachusetts, Connecticut and Virginia under the "sea to sea" charters. Moreover, it assured to the French in this region the free exercise of their Catholic faith, stipulated that a viceroy, with despotic sway, should govern there, and that the inhabitants were not to hold public meetings, to enjoy freedom of the press or have the right of habeas corpus. This act practically set aside colonial claim to the territory and aroused widespread indignation in the colonies.

Quebec, Battle of, a celebrated conflict on the Plains of Abraham, in the rear of Quebec, Sept. 13, 1759. Montcalm commanded the French garrison of the town, which numbered about 5000 regulars, 10,000 raw militia and 2000 Indian allies. The British attacking expedition was under Wolfe. It consisted of some 9000 men, most of whom were regulars. Wolfe reached Quebec in June and the summer was spent in vain efforts to take the city by storm; but at last a steep path was found which led up from a sheltered cove, since known as Wolfe's Cove, in the river bank. Over this, in the dead of night, 5000 British climbed to the Plains of Abraham. There a decided victory was gained over the surprised French who, though fighting bravely, in the hope of driving the English into the river, were utterly routed. Both Montcalm and Wolfe were killed in the struggle. The fall of Quebec, one of the most brilliant and far-reaching events in American history, was the deathblow to French power in America.

Quebracho, *Ka brah' cho,* the name of several species of South American hardwood trees, which belong to the Dogbane Family and which are valuable for both their wood and bark. The Chilean quebracho produces a drug, also called quebracho, which is employed as a tonic and as a remedy for spasms. The Argentine, or red, quebracho, has a bright red bark, rich in tannin, which produces a red dye. The bark of the white quebracho furnishes an alkaloid useful in wood engraving and also of value in medicine. True quebracho has lately been brought into the United States and is being successfully raised for its tannin. The United States Forest service has issued a helpful bulletin in regard to this tree, its wood, its financial importance and its cultivation.

Queen Charlotte Islands, a group of islands in the Pacific Ocean, situated off the coast of British Columbia, 130 m. n.w. of Vancouver Island. The two largest are Graham Island and Moresby Island. The area of the group is 5100 sq. m. There are dense forests, and gold-

bearing quartz, anthracite, copper and iron are mined. Increased transportation facilities which will be provided by the completion of the Grand Trunk Pacific Railway will doubtless lead to the development of these resources.

Queen Charlotte Sound, a channel in the Pacific Ocean, the northern portion of the passage which separates Vancouver Island from the mainland of the Dominion of Canada.

Queens'land, the northeastern state of Australia, bounded on the n. by the Gulf of Carpentaria and Torres Strait, on the e. by the Pacific Ocean, on the s. by New South Wales and on the w. by South Australia and the Northern Territories. It has an area of 668,497 sq. m., about one-fifth that of the United States. The long eastern coast line of Queensland is indented by many bays and estuaries and is protected by the long coral reef known as the Great Barrier Reef. Between this great reef and the mainland numerous coral islands rise from an ever-smooth sea. The eastern part of Queensland is rugged and mountainous, but the valleys near the coast are fertile and covered by forests of acacia and eucalyptus. Palms, mangroves and screw pines add to the luxuriance of the forest growth in the warmer regions. On the east side of the mountains, where the rainfall is plentiful, agriculture is the chief pursuit and is of growing importance. The grains of temperate climates, vegetables, fruits and sugar cane are abundantly raised. The latter is by far the most important crop.

Westward the mountains descend to a dry, treeless plain, not yet of value for ordinary agricultural purposes but extensively used for grazing. Cattle and sheep are raised in great numbers and the attendant industries of meat packing, dairy farming and wool cleaning flourish. Elsewhere flour mills, lumber mills, breweries and distilleries are common.

Queensland has many rivers of importance, some of which flow east to the Pacific, some north to the Gulf of Carpentaria, some to the basin of the Darling and some to the westward, where they drain away in the great western plain. Gold, silver, tin and coal are mined in the mountains, which are said to contain also every known kind of metal.

The government of Queensland is administered by a governor, appointed by the British Crown, and by an executive council of nine members. There is a Parliament of two houses, and Queensland sends nine members to the Australian House of Representatives. The principal cities are Brisbane, the capital; Charters Towers, Rockhampton, Townsville and Maryborough. Population in 1911, 605,813. See AUSTRALIA, COMMONWEALTH OF; BRISBANE.

Queens'town" Heights, Battle of, a battle of the War of 1812, fought at Queenstown Heights (now Queenston Heights), on the Canadian side of the Niagara River, Oct. 13, 1812. The Americans, mostly New York militia, were under General Van Rensselaer, who, crossing the river from Ft. George, attacked the Canadians stationed at Queenstown under General Brock. The United States troops succeeded in carrying a battery on the heights; but Van Rensselaer was not effectively supported by the other American commanders, the battery was lost and all the American troops were captured. Early in the action Brock was mortally wounded. In 1824 the Province of Ontario erected a monument to commemorate the spot where he fell. See BROCK, SIR ISAAC.

Quicksand, *Kwik' sand",* a body of loose sand mixed with water, into which solid bodies readily sink. Quicksands are usually found on the seacoasts and at the mouths of rivers. They are composed of particles of rounded sand that cannot be compacted together by pressure. An animal or other heavy object placed upon the surface is soon engulfed.

Quick'sil"ver. See MERCURY.

Quig'ley, James Edward (1854-1915), a Roman Catholic prelate, born in Oshawa, Ontario, Canada. He graduated from St. Joseph's College, Buffalo, N. Y., in 1872, after which he studied theology at Niagara, N. Y., at the University of Innsbrück, Austria, and at

Rome, where, in 1879 he received his doctor's degree. In the same year he was ordained a priest and became, in 1884, rector of the Cathedral in Buffalo. In 1897 he was consecrated bishop, and six years later became Archbishop of Chicago. Archbishop Quigley figured prominently as an arbitrator in the Buffalo labor strike of 1904.

Quiller-Couch, *Kwil' er-Kooch',* **Sir Arthur Thomas** (1863-), an English author, born in Cornwall and educated at Newton Abbot College, at Clifton College and at Trinity College, Oxford. After his graduation at Oxford he was for a time classical lecturer at Trinity, and later engaged in journalistic work in London. After 1891 he resided chiefly in Cornwall, depicting its scenery, traditions and characters in many of his books. His writings are marked by a vivid and dramatic imaginative quality, and he was selected to complete Robert Louis Stevenson's unfinished novel, *St. Ives.* His novels include *Dead Man's Rock, The Ship of Stars, Sir John Constantine* and *Hetty Wesley.* Besides a volume of excellent verse, published in 1896, he has also published a pleasing anthology from the 16th- and 17th-century lyrists, and an equally successful *Oxford Book of English Verse, 1250-1900. Adventures in Criticism* is a series of critical articles. He is widely known by his pen name, Q.

Quince, *Kwins,* a small tree of the Rose Family valued for its fruit. The quince is closely related to the apple and pear, both of which it resembles in fruit, flower and leaf. The quince is supposed to be a native of Asia, but it is extensively cultivated throughout Europe and America. When ripe, the fruit is a golden yellow and about the size of a pear. It is used chiefly for flavoring preserves and other fruit preparations.

Quincy, *Kwin' zy,* **Josiah** (1744-1775), an American patriot and lawyer, born in Boston and educated at Harvard. Admitted to the bar, he rose to distinction in his profession, and in 1770, with John Adams, defended Captain Preston, implicated in the Boston Massacre, thus exciting the enmity of certain influential citizens. He was fervent and powerful as a speaker and writer during the pre-Revolutionary period, and in September, 1774, he went to London in behalf of the American cause. His health, however, soon gave way, and he died upon the return journey when in sight of his native land.

Quincy, Josiah (1772-1864), an American statesman and lawyer, son of Josiah Quincy (1744-1775), born in Boston and educated at Harvard. He began practicing law in Boston in 1793, in 1804 was a state senator and in 1805 entered Congress as an extreme Federalist, opposing especially the admission of Louisiana as a state and the War of 1812. His ability made him a constant annoyance to presidents Jefferson and Madison. Retiring to agricultural pursuits in 1812, he later served in the Massachusetts Legislature, was mayor of Boston and from 1829 to 1845 was president of Harvard College.

Quincy, Ill., a city and county seat of Adams Co., 104 m. w. of Springfield, 263 m. s. of Chicago and 142 m. n. of St. Louis, on the east bank of the Mississippi River and on the Chicago, Burlington & Quincy, the Wabash, the Quincy, the Omaha & Kansas City and other railroads. Quincy Bay, an arm of the Mississippi, affords an excellent harbor for the various lines of river steamers. Railway and wagon bridges span the river at this point. There is excellent street-car service throughout the city, which covers an area of over five square miles, and railway lines connect with the near-by towns and cities in the Mississippi Valley. Quincy is built upon a plateau 160 ft. above the river, of which it commands an extensive view. The city has an important trade in grain and agricultural products and is the industrial and commercial center of a large region. The city is regularly laid out with broad and well-paved streets and boulevards, and there are handsome residential districts surrounded by lawns and gardens. In the public-park system of over 250 acres are Washington,

South, Indian Mounds, Riverview, Cedar Creek, Primrose, Gardner, Madison and Highland parks. The noteworthy public buildings include a courthouse, state armory, Federal Building, Labor Temple, Masonic Temple, city hall, Y. M. C. A. and Y. W. C. A. buildings, Quincy Historical Building, theaters, good business houses and about 33 churches. The city is the seat of an Episcopal bishopric.

Among the educational institutions are the Chaddock Boys' School (Methodist), Quincy College (Catholic) and St. Mary's Institute (Catholic), public and parochial schools, a high school, College of Music and Art, Conservatory of Music, a business college and the Quincy Law, Medical and Public libraries. Other institutions include the Blessing and St. Mary's hospitals, Woodland Home for orphans and friendless, Anna Brown and St. Vincent homes for the aged, St. Aloysius Orphans' Home and Lindsay Church Home. The State Soldiers' and Sailors' Home, with grounds covering about 225 acres, is located here. Lippincott Memorial Hall, one of the large number of buildings, was erected by the veterans of the institution in memory of Charles E. Lippincott, the first superintendent. Quincy has important manufacturing industries which are represented by foundries and machine shops, flour mills, an omnibus factory, sawmills and planing mills, governor works, stove and furnace works and manufactories of agricultural implements, awnings and tents, balloons, bank fixtures, bath cabinets, motor boats, skiffs, buttons, engines, confectionery, caskets, cereal foods, electric motors, elevators, saddlery, incubators, refrigerators, strawboard, structural iron, umbrellas, show cases, stationers' supplies and other diversified products.

John Wood, the first white settler, built a cabin on the site of Quincy in 1822. In 1825 Quincy was made the county seat, though having only a small number of inhabitants. The town and county were named in honor of John Quincy Adams. A general hospital of the United States army was located here during the Civil War. Quincy was incorporated in 1834 and chartered as a city in 1839. Population in 1920, 35,978.

Quincy, Mass., a city of Norfolk Co., 8 m. s.e. of the center of Boston, on Massachusetts Bay and on the New York, New Haven & Hartford Railroad. It is largely a residential suburb of Boston, from which it is separated by the Neponset River. The Fore River also separates it from Weymouth on the south. A number of villages are included within the corporate limits of the city, which has an area of about 16 sq. m., nearly one-fourth of which consists of public parks. The city contains the Thomas Crane Public Library, a city hospital, the Quincy Mansion School for girls, the Woodward Institute for girls, Adams Academy and a sailors' home. Here are large quarries of the celebrated Quincy granite, which is exported to nearly all parts of the Union. The first railroad in New England was constructed at this place in 1826-27. It was two miles long, operated by horses and was used for carrying granite from the quarries to tidewater for building Bunker Hill Monument. The city also has a large shipbuilding yard, and manufactories of iron, brass, rivets, boots and shoes, soap, chemicals, brass, iron and earthenware.

There are many places of historic interest in and around Quincy, and a number of buildings of Revolutionary War days are still standing. Many prominent people have made Quincy their home. It was the birthplace of John Hancock, of John Adams, second president of the United States, and of his son, John Quincy Adams. The town was settled in 1625 and first known as Mt. Wollaston. It remained a part of Braintree until 1792, when it was incorporated and the name changed to Quincy. It was granted a city charter in 1888. Population in 1910, 32,642. In 1920, 47,876.

Quinine, *Kwī' nine,* a bitter, crystalline substance obtained from the bark of the cinchona tree. The bark, whose medicinal qualities have been known since

1810, was once commonly used, but in 1820 the white powder was extracted and has since entirely superseded the bark. To prepare the drug, the strips of bark are treated with sulphuric acid, which extracts the quinine, and with lime, which precipitates it. After a process of drying, the precipitate is dissolved, filtered and evaporated until by repeated treatment it crystallizes into the form on the market.

The drug quinine has played an important part as a familiar and popular remedy for fever. In cases of malarial fever, if taken at the time of the beginning of a malarial spasm it kills the newly-liberated spores of the disease. At any other time it is not only ineffective but is liable to have unpleasant results upon the nerves, causing headache or even paralysis, blindness and deafness. The extensive use of quinine led to the cultivation of cinchona trees, which are found wild only in the Andes and in India. Quinine is white in color; it has no odor but is exceedingly bitter and disagreeable to the taste.

Quinsy, *Kwin' zy,* an inflammation of the membrane around the tonsils, usually terminating in ulcers. It is usually brought on by exposure of the body to cold or wet. Chills and fever usually precede or accompany the inflammation, which causes severe pain about the tonsil. Though decidedly painful, the disease is seldom fatal. It is most common between the ages of 15 and 40. One attack predisposes the system to another. Rheumatism also predisposes to the disease.

Quintil'ian (about 35-about 97), a Roman rhetorician, born at Calagurris (now Calahorra) in Spain. In 68 he began to practice in Rome as an advocate, gaining considerable renown in this capacity, but attaining distinction chiefly as a teacher of elocution. Among his pupils was Pliny the Younger. Quintilian was the first public teacher who received a fixed salary from the imperial treasury. His professional career as a teacher of rhetoric extended from 69 to 89; after the latter date he retired to private life. He was the author of an extensive work on rhetoric, in 12 books, displaying remarkable soundness of critical judgment, purity of taste and knowledge of the literature of oratory.

Quito, *Ke' to,* the capital of Ecuador, situated a little to the south of the equator, in a basin of the plateau formed by the Volcano Pichincha. Many of the streets are narrow and badly paved; the houses are built of sun-dried brick, sometimes covered with plaster or stucco. The architecture is Moorish or old Spanish. The chief buildings include the government palace, the archbishop's palace, the municipal hall, the Jesuits' church, the university, an astronomical observatory and, among several monastic institutions, the Convent of San Francisco, one of the largest of its kind in the world. The important manufactures are woolen and cotton goods, tanned leather, saddles, carpets, blankets and shoes. Religious paintings, wood carvings, gold and silver products, handmade carpets and lace are products of skilled labor. Quito was founded by the Spaniards in 1534. Population in 1906, 50,841.

Quoits, *Kwoits,* a game played out of doors with horseshoes, or with iron rings slightly concave on the underside and from 8¼ to 9½ inches in external diameter. Indoors, rubber rings are used, and, instead of having two pegs driven into the turf from 30 to 60 ft. apart, short wooden posts, supported on heavy iron standards, are placed at whatever distance is desired. The pegs used out of doors are called *hobs,* and should project one inch above the ground. The player stands with one foot against a hob and pitches two quoits in succession at the other hob. His opponent then does the same. The quoit that lies nearest the hob counts one. If both of A's quoits lie nearer the hob than either of those of his opponent, he scores two. A quoit that rests on edge, with the other edge against the hob, counts two, while one which encircles the hob counts three. The game is usually ten points. It is the usual practice to pitch alternately, first

from one hob and then from the other. When four play, two pitch from one and two from the other, changing positions from game to game. Other methods of counting are sometimes used, and the number of players may be increased as desired.

Quorum, *Kwo' rum,* the number of members of an assembly, either public or private, whose presence is necessary for the transaction of business. Unless the assembly makes a rule to the contrary, a majority of the voting members is necessary for a quorum, but any organization can fix the number by constitution or by-laws. When so fixed, the number is usually fewer than a majority and may be limited to a few members. In the United States Congress the Constitution fixes a quorum at a majority of the members of each house.

Quo Warranto, *Kwo Wo ran' to,* a Latin term meaning by what warrant. In law it is a writ issued to determine the right of an individual to the privilege of public office or franchise specified, and to have the person named in the writ removed by a court of competent jurisdiction. In most of the states of the United States quo warranto proceedings are brought in the name of the attorney-general of the state. The proceedings can be brought only in the highest court of original jurisdiction or in courts of appeal. Quo warranto proceedings may be instituted against those wrongfully claiming to hold public office, against officers of corporations who assume unlawful powers or privileges, against officers of public or municipal corporations when they unlawfully use public franchises, and against private individuals unlawfully exercising the privilege of a public franchise. Quo warranto proceedings can be instituted only to test rights suspected to be exercised unlawfully. They cannot be brought for the purpose of removing for misconduct one who rightfully holds office. Consult the statutes of your state for details.

R

RAB'BIT, a burrowing Rodent of the Hare Family and often confused with the hare because of the common use of either name for either animal. In America the term *rabbit* is used to include both rabbits and hares, but the true rabbit is smaller than the hare, has shorter ears and shorter hind legs. Unlike the hare it is somewhat slow of pace and its young are born hairless, helpless and blind. The rabbit is prolific, and were it not hunted by larger wood animals, would quickly overrun any country in which found. An example of this is found in the difficulty in Australia, where the Belgian hare, really the Belgian rabbit, was introduced to destroy insects, and became itself a pest.

The home of the rabbit is a burrow or community of burrows called a warren, and to this its timidity leads it upon the slightest hint of danger. The fur of the rabbit is grayish-brown, marked with white; in some species its winter coat is pure white. The common wood rabbit, called the cottontail or Molly cottontail, is a particularly bright little animal with keen eyes, plump body and fluffy, white tail.

Rabelais, *Ra" b' lé',* **François** (about 1490-about 1553), a French humorist and satirist, born at Chinon, in the Province of Touraine. Little definite knowledge has been obtained of his early life. In 1519 he was a member of the Order of St. Francis in the Convent of Fontenay le Comte. Later he joined the Benedictines, but he tired of the secluded life and became a secular priest, removing to Paris and to Lyons. He traveled in Italy, took his doctorate at Montpellier in 1537, and again pursued a wandering life, being employed as a physician from time to time. In 1550 he was appointed curé of Meudon, but it is doubtful that he resided there for any length of time. He wrote scientific treatises that have scarcely survived, and that are never read. His *Gargantua* and *Pantagruel,* first published separately and later together, appearing in several volumes, are his characteristic work. Here are mingled pure fooling, keen political insight and social satire.

Rabies, *Ra' bi eez.* See HYDROPHOBIA.

Raccoon, *Ra koon',* or **Coon,** a small American member of the Raccoon Family, found in the woods from Canada to Mexico. It is bearlike in its habits though it is much smaller, and in appearance resembles the badger. It has a long, sharp nose, rounding head and erect, sharp-pointed ears. Its back is arched, its tail is long and ringed and its feet flat-soled. The coon makes its home in hollow trees, where it curls up through the day, venturing forth at night to feed upon fresh vegetables, especially juicy green corn, or to find frogs, fish and snails along the water's edge. The fur of the coon, which is dark brown, with white markings on the face and tail, is used in making caps and coats. In the North the coon hibernates during the coldest months and comes forth early in February much weakened and easily captured. When tamed, coons become mischievous pets.

Racine, *Ra" seen',* **Jean** (1639-1699), a French tragic dramatist, born at La Ferté-Milon. He studied at Beauvais and at the l'École des Granges, where he became familiar with the old Greek classics and chose Euripides as his dramatic model. On going to Paris in 1662, he was presented to the King, and became a fashionable poet, and at this time the familiarity of the "four" began, including Molière, Boileau and La Fontaine. His first tragedy, *La Thébaide,* was performed in 1664. With Boileau he shared the honors and the du-

ties of the office of the royal historiographer. He wrote simple plays, often ignoring psychology and touching only those matters which furthered the development of plot. His greatest characters are women, and he makes passion dominate the will. The poet of the high-born, he never comes close to lowly life, and his society is ideal, rather than real. He merits a place among the greatest of French tragic poets. His works include *Alexander the Great, Andromaque, The Litigants, Britannicus, Bérénice, Bajazet, Mithridate, Iphigénie, Phèdre, Esther* and *Athalie.*

Racine, Wis., a city and county seat of Racine Co., 23 m. s. e. of Milwaukee and 60 m. n. of Chicago, on the west shore of Lake Michigan, at the mouth of the Root River, and on the Chicago, Milwaukee & St. Paul, the Chicago & North Western and other railroads. There is an excellent harbor permitting the entrance of large vessels, and the city has steamer connections to all the ports on the Great Lakes. Two interurban lines also connect with Milwaukee and other near-by towns and cities. Racine is the commercial and industrial center of a fertile agricultural region and has a large trade in farm and dairy products. The city is attractively situated about 40 ft. above the lake and about 690 ft. above sea level, and contains well-paved shaded streets and boulevards, several parks and many handsome residences. The most noteworthy buildings include a courthouse, Federal Building, Y. M. C. A. Building, city hall, a number of banks, good business houses and many church edifices.

Among the educational institutions are the Racine College (Protestant Episcopal), St. Catherine's Academy (Catholic), a high school, public and parochial schools, several business colleges and a public library. The benevolent and charitable institutions include St. Luke's and St. Mary's hospitals, Taylor Orphan Asylum and Dominican Convent.

Racine is distinctly a manufacturing city and ranks high among the cities of the state in the output of its varied manufactures. The chief manufacturing establishments include foundries and machine shops, flour and lumber mills, tanneries, boot and shoe factories, furniture factories, agricultural-implement works, steel-spring works, glove and mitten factories, valise and trunk factories, woolen mills, plating works and manufactories of brass and copper goods, thrashing machines, boilers, wagons, paints, sheet iron, automobiles, chemicals, malted milk, soap, iron and steel specialties, windmills, mangles, men's clothing, linseed oil, leather, hardware and lumber products.

In 1834 Gilbert Knapp, a captain on the Great Lakes, induced a number of families to make their homes at the mouth of the river and the settlement thus made was called Fort Gilbert. Sawmills were built here in 1835 and the place grew rapidly. The name was changed to Racine in 1837, being the French form of the name of the Root River. A city charter was granted in 1848. Population in 1920, 58,593.

Rack, a device for torturing, employed in the Middle Ages to extort a confession or a promise. It was a wooden frame a little longer than a bedstead. On this the victim was placed; his ankles were tied by a rope to a roller at one end, while his wrists were fastened with cords to another roller at his head. By means of levers these rollers were turned and the victims' limbs and body were stretched nearly apart. It was used by civil authorities for the punishment of conspirators and traitors, and during the days of the Inquisition it was frequently employed to extort recantations of religious opinions.

Rad'cliffe, Ann Ward (1764-1823), an English novelist, born in London. Like Horace Walpole's, her novels are of the type known as Gothic romance, wherein are emphasized horror, mystery and imagination. Favorite scenes are black dungeons and gloomy castles with secret passageways; her characters are desperate villains, rogues and clinging, weeping maidens. She was once re-

ported to have been driven mad by the very horror of her own descriptions. Her works include *The Mysteries of Udolpho, The Romance of the Forest* and *The Italian.*

Radioactivity, *Ra" di o ak tiv' i ty,* the power of certain substances, as uranium, thorium and radium, to emit rays of a peculiarly penetrating character. The radiation from such bodies contains three distinct kinds of rays, known, respectively, as *alpha, beta* and *gamma* rays.

The *alpha* rays consist of small particles several times as heavy as hydrogen atoms, and charged with positive electricity. They are projected with a velocity of about 20,000 m. per second and are capable of penetrating the air but a few centimeters. The *beta* rays consist of small particles about 1000 times lighter than hydrogen atoms, and charged with negative electricity. They seem to be of the same nature as cathode rays in a vacuum tube, except that they are projected with a somewhat greater velocity, which in the case of radium varies from .3 to .9 that of light. They are far more penetrating than *alpha* rays, being capable of penetrating several meters of air. The *gamma* rays seem to be of the same nature as Roentgen rays from a "hard" X-ray tube, and they probably originate from the collisions of *beta* particles with the substance itself near its surface, much as X rays originate from the impact of the cathode particles or rays against some obstacle. They are not particles, but are probably single impulses in the ether, and are the most penetrating rays known, having been detected after passing through 30 centimeters of iron. See Cathode Rays; X Ray.

Ra"diom'eter, an instrument for detecting radiant heat. It consists of a glass tube from which nearly all of the air has been exhausted. Within the bulb is a cross of aluminum wire, each extremity of which bears a vertical disk of aluminum or mica, having one face coated with lampblack. The cross of wire is so balanced upon a vertical standard that it revolves easily. When the radiometer receives radiant heat from a body, the cross revolves to keep the black faces of the disks moving away from the source of heat. This motion is due to the fact that dark faces absorb heat faster than do the unblacked faces. These faces also radiate heat more rapidly, thus making the molecules of air next the dark face vibrate faster than those upon the opposite side. The equality of pressure on the two faces of a disk thus being destroyed, the disks move in the direction of least resistance. The radiometer is exceedingly sensitive and indicates the slightest presence of radiant heat. It was invented by Sir William Crookes in 1873.

Rad'ish, a European garden herb of the Mustard Family, cultivated for its fleshy, edible root. As a plant it is rough and coarse, with a stout stem and many prickly leaves. The lower leaves are long and broad-lobed; those at the top are more feathery. When allowed to blossom the plant bears a spike of purple-white flowers having four pointed sepals, four small, flat petals and six stamens, of which two are shorter than the rest; these blossoms are succeeded by small, pointed, black-seeded pods. When grown as a vegetable the plants are pulled before blossoming, while the juice is still in the thick root. Radishes are grown by truck gardeners everywhere and their crisp, red- or white-coated stalks are in great demand in the spring. Many varieties have been developed through experiment, but the best are found to be the small, round radishes, raised in light, sandy soils.

Ra'dium, an element discovered in 1898 by M. G. Bémont and M. and Mme. Curie, French chemists. Two years previous to its discovery, Becquerel noticed that photographic plates protected from the light, but kept near uranium compounds, were affected in the same manner as though light had penetrated their coverings. He also discovered that a charged electroscope near these same compounds would gradually lose its charge. Becquerel concluded that these

effects were due to the action of rays from the uranium. Mme. Curie began experiments upon the uranium compounds and soon announced the existence of the new element. Radium is found only rarely. Formerly the chief source was pitchblende found in Bohemia in mines recently purchased by the Austrian Government. At present it is being manufactured in three other countries: Sweden, which produces it from kolm; England, which secures it from mines in Wales; and the United States, which obtains it from large deposits in western Colorado that also produce quantities of uranium and valuable vanadium. In Colorado ten tons of ore produce only between 20 and 30 milligrams of radium.

Radium has and transmits to its compounds the power of emitting rays which have a chemical activity, and such substances are said to be radioactive. The walls of the glasses or jars containing radium or its salts receive this property and slowly turn to a violet color; cloth is entirely wasted away by the action of the rays. All salts of radium are phosphorescent. A bit of radium left to itself gradually wears away, yet it does this so slowly that it has been estimated to require 2500 years for its complete breaking up. A gram of radium compound radiates in one hour enough heat to raise a gram of water from freezing to boiling point.

Because of its rarity, radium is very valuable. There are probably not more than two or three ounces in the world and its value is nominal; that is, it is worth whatever its possessor can get for it. An English radium-producing corporation places its value at $100,000,000 a pound. The rays radiating from it burn the skin, are believed to kill bacteria, have some chemical effect upon proteids and germinating seeds, and bleach the chlorophyll, or green coloring pigment, of plants. Little, however, is definitely known of its practical medical value. It is known to have curative effect upon lupus, a form of tuberculosis attacking the tissues of the face, and has been thought to be of aid in the treatment of cancers and ulcers, but experiments have not absolutely proven this. There are at present several radium banks in the world where tubes containing a tiny speck of radium can be rented at the rate of $50 per day. A radium institute for the treatment of disease was opened in London in the summer of 1911. Some of the best physicians of England are on the staff of this institution. See RADIOACTIVITY.

Raeburn, *Ra' burn,* **Sir Henry** (1756-1823), a Scottish painter, born at Stockbridge, near Edinburgh. His only teacher was David Martin, but he was strongly influenced by Reynolds and the Italian masters. He attained considerable fame and was knighted in 1822. His portraits are realistic and lifelike, and his brushwork facile and free. The most notable personages of his time were his sitters, among them Hume, Boswell, Jeffrey, Sir Walter Scott and Christopher North. Examples of his work may be seen in the Lenox Library and Metropolitan Museum, New York, and in the Art Museum, Worcester, Mass.

Raf'fia, a fiber made from the leaves of trees, belonging to the Palm Family and found in South America and other tropical countries. The fiber is prepared by cutting young leaves and stripping the skin from both surfaces. It is placed on the market in the form of long, narrow ribbons and is used in nurseries for tying up plants, in schools where weaving is taught, and elsewhere for basketry. It takes dye readily and may be bought in many colors.

Raffle'sia, a remarkable class of parasitic plants belonging to the Rafflesia Family and found chiefly in the tropics. The entire plant consists only of roots and flowers, for leaves, whose office is to provide starchy food for the plant, are in the case of parasitic plants an unnecessary adornment. The plant develops rootlets, called haustoria, which enter the bark of large vines or trees and there divide into slender filaments; any one of these filaments can form a

new plant, although the main object of the haustoria is to draw nourishment from the host plant rather than to produce new individuals. The buds are formed at the surface of the stem in which the plant is growing. After they have grown to about the size of a walnut, they burst and develop immense flowers which, when fully expanded, are over a yard in diameter and are the largest flowers known. They are very double and when opening resemble a large cabbage. Rafflesia blossoms are found in Sumatra and in the Philippines.

Rag'weed", a troublesome field and garden weed of the Composite Family. It is a tall, coarse plant with an erect, somewhat fibrous stem, often growing to the height of two or three feet and spreading out flat, much-divided leaves. These leaves give the plant a somewhat feathery appearance and are its only claim to beauty. The flowers are of two kinds: staminate, those which are to produce the fertilizing dust; and pistillate, which are to bear the fruit. The staminate are borne in long spikes and are tiny, insignificant blossoms. The pistillate grow in the axils of the leaves and are equally inferior. A species allied to the ragweed and often confused with it is the hogweed, or Roman wormwood, but it is distinguished by having more pleasing flowers. Both are obnoxious, dooryard weeds.

Rahway, *Rau' way,* **N. J.,** a city of Union Co., 19 m. s.w. of New York City, on the Rahway River and on the Pennsylvania Railroad. Rahway is an attractive suburban town and has fine homes of business men of the near-by greater cities. As an industrial center it is of considerable importance, having extensive manufactories of printing presses, carriages, felts, lace curtains, music boxes, electrical supplies, chemicals, axles, skirts, etc. Population in 1910, 9337. In 1920, 11,042.

Raikes, *Rakes,* **Robert** (1735-1811), the father of the Sunday School, a printer and proprietor of the *Gloucester Journal,* England. In 1780 he and some fellow workers opened a school on Sunday for the instruction of neglected children. He advertised the school in his paper and the notice was copied in the London journals, causing considerable comment. He persevered in his undertaking for about 30 years, during which time Sunday Schools were established extensively throughout England.

Rail Family. The rails have rather long legs and toes, a narrow body and a pointed bill. They all have short wings, which render them poor flyers. When disturbed they seldom fly but skulk about in the rushes and sedges, their brownish-streaked plumage affording them effectual protection.

Carolina Rail, or Sora, frequenting the marshes and meadows of temperate North America, is best known. This rail is about the size of a robin; the upper parts are olive-brown, spotted with black and streaked with fine, white lines; the under parts are whitish; the sides are barred black and white; the cheeks and breast are grayish; and the throat, face and part of the top of the head are black. The nest is built in a marsh, usually on a mound of grass or rushes, and is made of swamp grasses. It contains 7 to 16 reddish and purplish-spotted eggs.

Virginia Rail. This is larger than the robin, has a long, pointed bill and is streaked brown and black, having a white chin and cinnamon-brown throat and breast. The flanks are black, barred with white.

Rail'road", or **Railway,** a road containing parallel lines of rails laid end to end and fastened to sleepers so that wagons can run over them. The term *railroad* is in general use in the United States, while *railway* is more generally used in the British dominions.

Early History. The origin of the railroad in its simplest form is not definitely known, but the roads in which our present systems had their beginning were tramways constructed for hauling coal from the mines in England. Cross pieces, called ties, were laid on the roadbed, and timbers, which served as rails,

were fastened to them. Strips of plank were nailed on the outer edge of the upper surface of the timbers to keep the wagons on the track, and the space between the ties were filled with earth or gravel to give the horse a good path to walk over. Roads of this sort were in use as early as 1672. Wooden rails were in use about 40 years, when they were replaced by iron rails.

Many attempts were made to apply steam power to hauling carriages upon these railways before a successful locomotive was made. Success was achieved by George Stephenson, an English engineer, in 1829, whose *Rocket* was the first practical locomotive. In that year it was given a trial on the Liverpool & Manchester Railway (See STEPHENSON, GEORGE). Within the next ten years the foundations of all the great railway systems of the British Isles and most of those on the Continent of Europe were laid. These systems have continued to expand with the development of commerce.

UNITED STATES. The first railroads in the United States were constructed for hauling stones and coal, and horses were used for motive power. In 1827 a railroad was built from Quincy, Mass., to the coast, and the same year another road was built from the coal mines of Mauch Chunk, Pa., to the Lehigh River. The next year the Delaware & Hudson Canal Company began a road. The first charter for a railroad in the country was granted by the Legislature of Maryland for the Baltimore & Ohio Railroad in 1827, and the road was begun the next year. This was the first of the American roads that later developed into great systems. Between 1830 and 1840 many railroads were chartered, and by 1835 about 800 m. had been completed. In 1861 the mileage was about 30,000 m., but during the Civil War railroad construction practically ceased. With the close of the war, however, it was revived and has continued to the present time.

The first locomotives were imported from England in 1829. In 1830 Peter Cooper built a locomotive which weighed about a ton; the boiler was about the size of a barrel, and its flues were made of gun barrels. This locomotive was placed on the Baltimore & Ohio Railroad and attained a speed of 18 m. an hour. The English locomotives were constructed for straight tracks and were not suited to the curves found necessary in American railroads. This condition led to the construction of locomotives having the four-wheeled truck, or bogie, and incidentally to the founding of the locomotive industry in the United States. The first passenger cars were stage coaches mounted on wheels constructed to run on the rails.

Trunk Lines and Systems. For a term of years there was no attempt to unite the numerous short lines into one continuous trunk line, and passengers were obliged to change cars and buy tickets at each point where one line ended and another began. The expense and inconvenience of operating so many short lines of railway gradually led the stockholders of connecting lines to form traffic agreements, by which the cars of one company could be hauled over the road of another. In this way the great trunk lines east of the Mississippi, such as the New York Central extending from New York to Buffalo, were formed before 1870. The completion of the Union Pacific and the Central Pacific in 1869 was an epoch-making event in the history of transportation in the United States. These roads with their connections formed a continuous line from the Atlantic to the Pacific. This was the pioneer transcontinental line and was the first railroad project to which the United States Government lent its aid. The Union Pacific was followed by the Santa Fe and the Southern Pacific to the South, and by the Northern Pacific to the North. Later came the Great Northern and the Chicago, Milwaukee & Puget Sound line. The Canadian Pacific was completed in 1883, and the Grand Trunk Pacific should be completed by 1915, thus giving Canada two great transcontinental lines.

The completion of these great trunk lines for traffic led to the combination of lines between the Mississippi and the Atlantic coast with them in such a manner as to group all the leading railways of the country into a few great systems, each dominated by a group of capitalists. In 1912 the following great systems were in operation:

GROUPS.	MILEAGE.
Vanderbilt	25,360
Pennsylvania	20,320
Harriman	28,110
Hill	13,410
Morgan	13,563
Gould	21,411
Moore-Reid	28,340
Rockefeller's	17,210
Walters'	11,351
Erb Syndicate	12,512
Independent	24,510
Total	216,097

CONSTRUCTION. The first step in the construction of a railroad is the organization of the company; the second, the tentative location of the line; and the third, the financing of the enterprise, though this step is so closely related to the first that it is difficult to separate them. The men who form the company are usually the heaviest stockholders, but if their investment is not sufficient, additional funds are secured by selling stock and issuing bonds, which are purchased by capitalists who invest smaller amounts than the original stockholders. Before the road is permanently located, several preliminary surveys are usually made, and the location is determined by the cost of construction, the expense of operation and the traffic that can probably be secured. The location which comes nearest to meeting all these conditions is the one chosen, although it may not be the shortest distance between the points connected.

The next step is securing the right of way or purchasing the land the road is to occupy. This usually consists of a strip 100 ft. wide, with additional space for yards and stations. The final survey is then made. This shows the amount of cutting and filling that must be done to make the required grade. The engineer tries to make the cuts and fills equal, since this reduces the cost of construction; and to keep the grade as low as possible. The construction work is done by contract, the line being divided into sections, each of which is under the supervision of an assistant engineer, who reports to the chief engineer. For a single track the road bed is from 14 to 18 ft. wide at the top and from 20 to 26 ft. at the bottom, unless the embankment is high, when the bottom is wider.

As fast as the road bed is completed, the track is laid, and construction trains begin to bring ties, rails and other material as it is needed. With modern appliances a construction gang can lay a mile of track a day. This requires 3170 ties, 352 rails and a carload of bolts, spikes and angle irons. The standard gauge, or distance between the rails in use on all American railways, is 4 ft., 8½ inches. After the track has been laid it is ballasted; that is, the ties are embedded in earth, gravel or crushed stone so that they cannot move. As this is done, the ties are leveled so as to make the track even and smooth. Sidings, yards and stations, with the necessary switches, must also be put in before the road can be in full operation.

EQUIPMENT. The equipment of a railroad consists of passenger stations, freight depots, yards, shops, water tanks, locomotives and cars and such other appliances as are necessary to operate the road, such as telegraph and signals. The extent of the equipment must depend upon the amount of traffic the road handles. A short line in a densely populated region may require a more extensive equipment than a long line extending through a sparsely settled region. Lines entering large cities require extensive terminal facilities for handling suburban traffic. Long lines require elaborate passenger equipment, and their best trains compare favorably with the best hotels in their provision for the comfort and pleasure of the passengers. The freight equipment is much more extensive than the passenger, though not relatively so expensive. The cost of

freight cars ranges from $700 for the ordinary flat car to $1500 for the best steel box car. The cost of passenger cars ranges from $9200 for a steel day coach to $29,500 for the most expensive sleeping car. In 1912 there were over 40,400 passenger cars and about 2,355,000 freight cars, and over 65,300 locomotives in the United States.

Operation. A railroad corporation is thoroughly organized. At the head is the president, who is usually the largest stockholder. In large corporations there are usually several vice-presidents, each having charge of some special department of the road's activities. For purpose of operation the line is divided into divisions, each of which is in charge of a division superintendent. A general superintendent has charge of the entire line, and it is the duty of division superintendents to see that the orders of the general superintendent and other general officers are carried out on the respective divisions. Aside from this their authority is supreme in their respective divisions. Some other general officers are traffic manager, general passenger agent and master mechanic. The track in each division is divided into sections about five miles long, and each section is in charge of a section boss and two or three assistants. It is the duty of each section crew to make such minor repairs as are needed to keep the track in good condition, and to patrol the track so that any damage caused by one train may be discovered before another train passes over the section.

The movement of trains in each division is in charge of a train dispatcher, who knows the position of every train on his division, and in case of delay or accident to any train gives such orders to other trains as to cause the least possible delay. Conductors and engineers are responsible for moving the train in accordance with the time-table, which is to be followed unless they receive orders to the contrary. If the train falls behind the schedules more than 15 minutes it becomes subject to special orders. All railway crossings, sidetracks and approaches to stations contain signals which tell the engineer whether or not the track is clear. These signals and the switches are operated by levers, or in large yards by electric power. The operating apparatus is located in a tower, which is so situated that the one in charge has a clear view of the tracks in all directions. The signal apparatus most commonly used is the semaphore and consists of a mast or post about 24 ft. high, to which a board called an arm is attached near the top. Another arm may also be attached below the first. The arms are held in place by a bolt, on which they are easily turned, and by means of the signaling apparatus can be raised to a horizontal position. The short end of the arm has an iron frame, which holds three disks of glass, one red, one green and one plain. A light is placed back of these disks at night. The arm in horizontal position is the signal of danger and means stop; in an oblique position it means caution, proceed slowly; in a vertical position it means a clear track. A red light means stop; a green light, clear track; and a yellow light, caution. The disks in the short arm of the semaphore are so placed that the color of the light displayed corresponds with the day signal; that is, when the arm is in a horizontal position a red light is shown and when in a vertical position a green light is shown. In all departments the greatest precautions for safety are taken, and passenger trains travel long distances at high rates of speed without the slightest hindrance.

Extent. The United States contains the largest railway mileage of any country in the world. In 1916 the total mileage, not counting double tracks and sidings, was over 266,031 m., and with second tracks and sidings it was over 359,000 m. About 1,020,000,000 passengers and over 1,817,000,000 tons of freight were carried. The mileage of the other leading countries is as follows: United Kingdom, 23,280; Germany, 36,235; Russia, 35,347; France, 24,915; Austria, 13,591; Hungary, 12,-

177; Italy, 8719; Sweden, 8114; Norway, 1501; Canada, 24,731; British India, 30,576; Argentina, 13,690; Japan, 4444; Brazil, 13,279; South Africa, 7045. See ELECTRIC RAILWAY.

Rail'way" Post Office. See POST OFFICE, subhead *Railway Post Office.*

Rain, falling drops of water, the descent of which is due to natural causes. For the formation of rain the water vapor of the atmosphere must undergo condensation. This water vapor is derived through evaporation from moist surfaces of the land, but chiefly from the ocean. Evaporation is continually going on. A given volume of air can contain only a certain amount of this water vapor at a given temperature, and when this amount is present the volume of air is said to be saturated. If the temperature of such a volume of saturated air falls to the dew point, the vapor is condensed or changed back to water in the form of minute particles constituting clouds. When the tiny globules of water which form the cloud unite, the weight of the drop causes it to fall, unless upheld by strong air currents. Although water vapor is chemically pure, rain water, because it has been condensed upon particles of solid matter, contains quantities of soot, dust, pollen of plants and numerous other impurities. Rain water also contains a small percentage of ammonia, carbonic acid gas and nitrogen. See DEW; CLOUD.

RAINFALL. The size of raindrops varies according to conditions of the atmosphere. If rain falls through dry air the drops may be greatly reduced in size by evaporation before they reach the surface, but if the air is saturated at the time of the rainfall the drops are apt to promote condensation upon their surfaces in their downward passage and thus greatly increase their size. A fall of droplets smaller than one-twentieth of an inch in diameter is commonly called a mist. Numerous instances of abnormal rainfall have been recorded. It sometimes happens that rain fails to reach the ground because of the excessive dryness of the atmosphere. In such cases the moisture is evaporated and changed back to vapor in mid-air. These "suspended" showers are a common phenomenon in the desert areas of Arizona and in parts of other Western States. When water vapor is condensed at a rapid rate near the surface or above moist air, a heavy rainfall often results, in which the water appears to come down in sheets. This is known as a cloudburst. Although rain commonly falls from clouds, small quantities of rain have been observed to fall from a cloudless sky. This occurs when the temperature of air nearly free from dust falls to the dew point and there is a large quantity of water vapor to be condensed. As moisture condenses only upon a solid substance, each of the few solid motes becomes covered with a heavy coating of water, and drops are formed instead of cloud particles, and these drops fall as rain.

DISTRIBUTION. The rainfall of the earth is very unequally distributed, with the result that some localities are continually drenched while others are desert wastes. The geographical distribution of rain depends upon the distance from the sea, winds and the irregularities of the land. All coast lands visited regularly by winds blowing from the sea have heavy rainfall. The reason is obvious. The windward side of high mountains usually have heavy rainfall, while the opposite slopes are dry. This is due to the fact that when rain-bearing winds traveling horizontally reach the mountains they invariably ascend their slopes and are chilled and condensed, giving rise to a heavy downpour. The heaviest rainfall in the world, on the southern slopes of the Himalayas, is due to the combination of the three powerful rain-producing agencies. The monsoon winds blowing from the Indian Ocean are intercepted by the mountains and deposit their moisture in destructive abundance. The average precipitation is 500 inches a year in the areas of greatest rainfall. In general, the rainfall is heavier in tropical regions than

elsewhere, because of the greater evaporation. Here the annual variation in humidity is greater than that of temperature, and causes periodic or seasonal rains. In the United States the regions of the greatest rainfall are: the northwest coast, which averages 100 inches, the northeastern shore of Mexico, the southeast coast of Florida and a portion of the North Carolina coast. The region of least rainfall is the southwestern part of Arizona. See CLIMATE; HUMIDITY.

Rain'bow", a curved band of color often seen in the heavens during or after a rain or commonly seen in the mist over cataracts or falls. It is caused by the reflection and refraction of the sun's rays when they strike the spherical drops of water at certain angles. The drops act like prisms and by refraction separate the rays into the seven colors of the spectrum. A complete bow is made up of two bands of color. The inner and more distinct is called the primary bow; it is formed by the rays striking the drops on the upper side, being refracted as they pass into the drop, striking the inner surface and being totally reflected to the lower side of the drop, where they are once more reflected as they emerge and so reach the eye of the observer. The red rays are at the outer part of the band, the violet at the inner, and the intermediate colors, arranged in order, lie between. In the secondary bow, which lies above, the colors are reversed and are less distinct; this is because this bow has been formed by the rays that strike the drops on the lower side, and the light rays have been twice totally reflected within the drop.

Sometimes other bows appear within the primary bow and overlapping the violet; these are called supernumerary bows and are seen only when the primary bow is of unusual brightness. The center of the bows is always in a line from the sun through the eye of the observer. A bow known as a white rainbow is occasionally seen by moonlight. Its whiteness is due only to the faintness of the light, as all colors are less distinct by moonlight. As has been said, rainbows are also seen in mists over falls and are noticeable in escaping steam, and even sometimes in the dew on the grass, when the sun is at the right angle. See LIGHT, subhead *Refraction of Light.*

Rain Crow. See CUCKOO FAMILY.

Rain Gauge, *Gaje,* an instrument for measuring the amount of rainfall in any given place for any given time. Rain gauges are of various constructions. One of the simplest gauges consists of a funnel-shaped catch-basin which empties into a vertical sheet-metal cylinder from five to eight inches in diameter and having the same water-surface area as the receiving mouth of the funnel. Such an apparatus is furnished by the United States Weather Bureau to its stations and to voluntary observers. When in use, the gauge should be placed in an open space at a distance as far removed from houses, trees and other objects as the height of the object, and should rest upon a support 12 inches above the ground to prevent splashed particles from entering the receiver from the ground. The best measurements are obtained where it is possible to set up the gauge within a shallow depression of the ground or upon the flat roof of a building protected on all sides by a balustrade, the object being to prevent the formation of eddies of wind to which the presence of the gauge gives rise.

Rainy Lake, a lake forming a part of the boundary between Minnesota and the Province of Ontario. It is about 160 m. w. of Lake Superior. Its length is about 50 m. and its width varies. It discharges its waters through Rainy River into the Lake of the Woods.

Rai'sins, various species of fruits, usually grapes, comparatively rich in sugar, and dried. The best method of drying is to cut the stalks half through when the fruit ripens, allowing the finest grapes to dry on the vine by the heat of the sun. Another method consists in picking the grapes and placing them in large trays which are exposed to the sun. In the dry climate of Cali-

fornia this method produces raisins of the highest grade. For a cheaper grade, the grapes are dried in ovens. Raisins are imported from southern Europe, Egypt and Asia Minor, those from Malaga grapes being the richest in sugar. California produces raisins in large quantities and of a superior quality. A variety of raisins without seeds and known as sultanas comes from Turkey. Dried currants, sometimes called Corinthian raisins, are obtained from the islands of Greece. See GRAPE.

Rajputana, *Rahj" poo tah' na.* See INDIA.

Rake, an agricultural implement for gathering up loose material. The hand rake consists of an iron or wooden bar, carrying a number of parallel teeth or tines, into which is fitted a long handle. Farmers employ a two-wheel vehicle with a number of long, curved tines made of heavy steel wire fitted to a bar between the wheels, which are about eight feet apart. This bar is hinged and is operated by means of a lever from the driver's seat. This style of rake is drawn by a horse, and is used to gather hay into windrows.

Raleigh, *Raw' ly,* **N. C.,** the capital of the state and the county seat of Wake Co., situated almost precisely in the center of the state, on the Seaboard Air Line, the Southern, the Raleigh, Charlotte & Southern and the Norfolk Southern railroads. Large quantities of cotton and tobacco are grown in the surrounding region. Hydroelectric power is derived from the Yadkin, Cape Fear and Neuse rivers, to the amount of 52,000-horsepower, and the city is the power center of eastern North Carolina. The manufactures include cotton goods, woodenware, foundry and machine-shop products, brick, flour, cottonseed oil and phosphate fertilizers.

Raleigh is situated at an elevation of about 375 ft. above sea level and has many attractive features. It is known as the "City of Oaks" from its beautiful oak trees. From Union Square, a park of eight acres in the center of the place, occupied by the state capitol, extend four broad streets, named after former capitals of the state, producing an effect of spaciousness and symmetry. The capitol, state administration building, post office and governor's mansion are among the noteworthy public buildings. Raleigh has 29 educational institutions, including the North Carolina College of Agriculture and Mechanic Arts; three colleges for young women—St. Mary's School (Protestant Episcopal), Meredith College (Baptist) and Peace Institute (Presbyterian); two colleges for negroes—Shaw University (Baptist) and St. Augustine's (Protestant Episcopal). Other institutions of importance are the state school for the white blind, the largest in the United States; the state school for negro deaf-mutes and blind, the largest in the world; the state hospital, with a department for the criminal insane; the state hospital for white insane and epileptics; the State Geological Museum; a Methodist orphanage; a Roman Catholic orphanage; an old ladies' home; three hospitals—Rex (white), St. Agnes and Leonard (colored); and the Confederate Soldiers' Home. There are three large libraries, the North Carolina State Library, that of the State Supreme Court and the Olivia Raney. Among the interesting features in and near the city are the Confederate and National cemeteries, Pullen Park, the Country Club and its golf links, Bloomsbury Park, the state experiment farms and fair grounds. Raleigh is the seat of a Protestant Episcopal bishopric.

The first settlement on the site of Raleigh was known as Wake Courthouse. In 1792 the site was selected for the state capital and was purchased, so that the state owns streets and sidewalks. The new city was laid out in the same year and named in honor of Sir Walter Raleigh. It was incorporated in 1795 and again in 1803; and is governed under a revised charter of 1899. President Andrew Johnson was born at Raleigh. The army of Gen. W. T. Sherman occupied the city for a time in 1865. Population in 1920, 24,418.

Raleigh, Sir Walter (about 1552-1618), an English navigator, soldier, statesman and author, born in Devonshire, England, and educated at Oxford. When 17 he joined a company of gentlemen volunteers, raised to assist the Huguenots, later he fought in Netherlands, attempted, with his half-brother, Sir Humphrey Gilbert, to reach the Western continent, and in 1580 distinguished himself in the Irish rebellion. Being now admitted to the court of Queen Elizabeth, he was accorded great honors, tradition has it, because he once threw his scarlet coat into the mud for the Queen to walk on. In 1584 he obtained a charter of colonization and subsequently he made futile efforts to establish a settlement in Virginia, exhausting in these schemes some $200,000. The same year he was knighted. In 1586 he obtained vast Irish lands, which had been forfeited and on which he introduced potato and tobacco culture.

During 1587-88, when the Spanish invasion threatened, Raleigh performed important services in levying and organizing the militia in the western part of England. Subsequently he formed an unsuccessful company of "Merchants and Adventurers" to colonize in America, brought Spenser, the poet, from Ireland to the court of England, where he himself lost favor, and in 1594 embarked on an expedition to Guiana in search of the fabled El Dorado. He reached the Orinoco and, in the name of Elizabeth, took formal possession of the country, about which he later published a highly colored account. In 1596 he commanded in the navy, under Lord Howard and the Earl of Essex, against Spain, assisting at the defeat of the Spanish fleet and the fall of Cadiz.

The death of Elizabeth in 1603 was fatal to the fortunes of Raleigh. James I deprived him of all preferments and soon had him arrested on a charge of complicity in Lord Cobham's plot against the throne. Though found guilty and sentenced to death, in 1603, Raleigh was reprieved and imprisoned in the Tower for 12 years. During this period he wrote his *History of the World.* Released in 1616, but not pardoned, he was commanding admiral of a fleet of 14 ships which James sent to open a gold mine, supposed to exist near the Orinoco. Not only was the undertaking a failure, but during it, in defiance of instructions, Raleigh's men attacked the Spaniards; consequently, on his return, to favor the Spanish throne, James ordered his execution under the sentence of 1603.

As a public official Raleigh was as unscrupulous as his contemporaries; but in ability he will probably be considered among the foremost men of all times.

Ralph Connor. See GORDON, CHARLES WILLIAM.

Ramée, *Ra ma',* **Louise de la** (1840-1908), an English novelist better known by her pen name of Ouida, born at Bury St. Edmunds. She lived in London and later in Florence, and wrote novels characterized by dramatic power and sentimentality. Her writings embrace *Under Two Flags, A Dog of Flanders, In Maremma, Two Offenders, Street Dust, Views and Opinions* and *Critical Studies.*

Rameses, *Ram' e seez,* **II** (about 1340-1273 B. C.), the Pharaoh who oppressed the Hebrews. He was a patron of art and science, and built a wall of defense from the Mediterranean to the Red Sea, east of the present line of the Suez Canal. He conquered parts of Syria and of Ethiopia, but failed to overcome the Hittites, as he at last concluded a treaty with them in which the ruler of the Hittites is called "The Great King of Khita," and is recognized as the equal of the King of Egypt. His mummy was found in a pit near Thebes in 1881. See LUXOR, THE TEMPLE OF.

Ram'ie. See BŒHMERIA.

Ramsey, *Ram' zy,* **Alexander** (1815-1903), once governor of Minnesota and United States senator, born near Harrisburg, Pa. He began practicing law in 1839, was elected to Congress in 1843 on the Whig ticket, and from 1849 to 1853 was governor of the Territory of Minnesota, and of the State of Minne-

sota from 1859 to 1863. He was mayor of St. Paul, United States senator from 1863 to 1875, secretary of war under President Hayes, and a member of the Utah and other commissions.

Ranch'ing, in the United States, the term originally applied to breeding live stock on a large scale, as carried on in the western part of the country. The application of the term has now been broadened until ranching means the same as farming in all parts of the country, except the New England and Eastern states. The original stock ranch was a large tract of land devoted almost entirely to grazing purposes. The ranch was seldom fenced, and the stock was kept upon it by herdsmen on horseback, and generally known as cowboys. With the advancement of settlements westward, these ranches gradually disappeared, giving place to regular farms upon which grain and other produce and live stock are raised. These farms differ from those farther east only in size and consequent methods of tillage and harvesting. Here agricultural machinery of the largest capacity is usually employed. See REAPING MACHINE; THRASHING MACHINE; TRACTION ENGINE.

Ran'dall, Samuel Jackson (1828-1890), an American statesman, born in Philadelphia. He was educated for a mercantile career but early entered politics, and, having served for a time in the Union army and been a Whig, he entered Congress as a Democrat in 1862, holding his seat continuously until his death. He was an acknowledged leader in the House and from 1876 to 1881 was speaker, in this capacity establishing a high reputation as a parliamentarian. Later in his service he assumed an independent course as leader of that wing of his party which opposed tariff reform and favored protection.

Randolph, *Ran' dolf,* **Edmund Jennings** (1753-1813), an American statesman, born in Williamsburg, Va. He studied at William and Mary College, took a course in law and was admitted to the bar of Virginia. He assisted in framing the constitution of Virginia, was a member of the Continental Congress in 1780, governor in 1786, and one of the drafters of the Constitution of the United States, which he refused to sign on account of his disapproval of certain features. He recommended its ratification, however, later in Virginia. He was the first attorney-general of the United States, and became secretary of state in 1794, but resigned the following year. He was a distinguished lawyer, a powerful speaker and an influential writer.

Randolph, John, of Roanoke (1773-1833), an American lawyer and statesman, born at Cawsons, Va. He was second cousin to Edmund Randolph. He was admitted to the bar, but gave his attention chiefly to politics, going to Congress in 1799 and, with the exception of two terms, continuing to occupy a seat there for 26 years. For two years he was a United States senator. In 1830 he went as minister to Russia, returning the next year, and in 1832 he was again elected to the senate, but died before he could take his seat.

Randolph, Peyton (1723-1775), an American statesman, born in Virginia. He studied at William and Mary College and took a law course in London, England. In 1748 he received the appointment of governor-general of Virginia. Later he was a member of the House of Burgesses and opposed Parliament. In 1774 he was president of the Continental Congress, resigning on account of failing health. He took his seat in that body again the following year, but died soon after in Philadelphia.

Randolph-Macon System of Colleges and Academies. The five institutions included are under the control of one self-perpetuating board of trustees; two of them are academies for boys, located at Bedford City and Front Royal, Va., while a third is the institute for girls at Danville. Randolph-Macon College was chartered in 1830 and opened two years later at Boydton under the auspices of the Methodist Episcopal Church, South, thus being

one of the oldest Methodist colleges in America. Closed during the Civil War, it was removed to Ashland in 1867. Its assets are reported at about $500,000, including the library of some 15,000 volumes. It enrolls about 150 young men. Randolph-Macon Woman's College, at Lynchburg, was opened in 1891 and enrolls about 500. It reports a library of some 10,000 volumes and assets exceeding $500,000. See WOMEN, COLLEGES FOR.

Rangoon, *Ran goon',* the capital of Burma, located near the southern coast of Lower Burma, about 20 m. from the Bay of Bengal. It is the third seaport town of the Indian Empire and exports teak, rice, lumber, oils and fabrics of different kinds. The city is well planned but consists chiefly of small buildings, many of which are constructed upon piles. Its peculiarity consists in the fact that the various trades occupy separate sections of the city. Rangoon has many Buddhist temples and monasteries, two colleges and a large museum. The chief industry is shipbuilding. The city has been held by the English since 1852 and has developed rapidly in recent years. Population in 1911, 293,316.

Rank, relative dignity and importance of command in the army and navy. The corresponding rank in the American army and navy is as follows:

COMMISSIONED OFFICERS

	Army	*Navy*
1	General	Admiral
2	Chief-of-Staff	Vice-Admiral (abolished)
3	Major-General	Rear-Admiral (first nine)
4	Brigadier-General	Rear-Admiral (second nine)
5	Colonel	Captain
6	Lieutenant-Colonel	Commander
7	Major	Lieutenant-Commander
8	Captain	Lieutenant
9	First Lieutenant	Lieutenant (junior grade) or Master
10	Second Lieutenant	Ensign

NONCOMMISSIONED OFFICERS

Sergeant	
Corporal	Midshipman

The office of general is honorary. It was created by Congress for Washington in 1799; for Grant in 1866; for W. T. Sherman in 1869; and for P. H. Sheridan in 1888. Upon the death of Sheridan the office was discontinued. The office of admiral is also honorary. It was created in 1866 for Farragut, and has been conferred upon Porter and Dewey.

The office of lieutenant-general was abolished in 1903, and in its place was created the office of chief-of-staff. This officer has general oversight of the army, cooperating with the secretary of war, under the president. The office of vice-admiral was created in 1864 for Farragut, and David D. Porter succeeded to the title, which was abolished at his death.

The office of commodore was abolished in 1899 and all who held that title at the time were made rear-admirals.

The officers in the navy below captain are assigned to different smaller vessels or duties on larger vessels as occasion may require. See ARMY, UNITED STATES; NAVY.

Ranke, *Rahng' ke,* **Leopold von** (1795-1886), a German historian, born at Wiehe, Germany. He was educated at the University of Leipsic, taught at Frankfort-on-the-Oder and in 1825 became professor of history at the University of Berlin. He published about 50 volumes of history, some of them written with undiminished vigor after he was 80 years old. Ranke was not a particularly brilliant writer, but very readable; and he was a man of rare judgment in the selection of historical material and its arrangement so as to give the clear connections and direct trend of events. Among his works are *A History of the Romance and Teutonic Nations from 1494 to 1535, Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries, History of the Popes, History of Germany, History of France, History of England* and many others.

Raphael Sanzio, *Raf' a el Sahn' zyo,* (1483-1520), the greatest Italian painter of the Roman School, was born at Urbino, a center of intellectual and artistic

activity of that day. After studies with his father, an artist in high favor at the court of Urbino, he became a pupil of Perugino at Perugia in 1499. To this period belong two Madonnas in Berlin and one in St. Petersburg, and the *Marriage of the Virgin* in the Brera Gallery, Milan. In 1504 he removed to Florence, where his talents developed rapidly under the influence of Leonardo and of Michelangelo. He assimilated readily all that was best in the Florentine masters, perfecting what he found to be the peculiar virtue of each and combining their several merits in a harmonious whole.

In 1508 Raphael was called to Rome by Pope Julius II to decorate four chambers of the Vatican. There, working in close proximity to Michelangelo, who had preceded him, and surrounded by the noblest masterpieces of antiquity, his art ripened into full perfection. The distinguishing qualities of his works were masterful composition, beauty and serenity of expression, harmony and purity of color and refinement of taste. His friendships were without number, even among envious fellow artists. The wide range of subjects which he treated in the papal apartments testifies to his fertility. Classical, Biblical and allegorical subjects adorn the first chamber; in the second, the triumph of the Church over its temporal foes and over false doctrine is set forth; the third and fourth rooms contain historical subjects. Raphael's numerous portraits and Madonnas, notably the superb *Sistine Madonna* in Dresden, cartoons for tapestries, the Chigi *Sibyls,* the beautiful *Galatea* and the paintings in the Chigi Chapel, the Farnesina designs,—all testify to the perfection of his genius. He was buried in the Pantheon at Rome.

Ra'pier, a long light sword for thrusting. This sword is pointed but not edged, and is the weapon of most frequent use in fencing. In the 16th century it was generally used in dueling. Its principal use now is as a dress sword. See SWORD.

Rappahannock, *Rap" a han' uk,* **River,** a river of Virginia, rising in the Blue Ridge Mountains in the west-central part of the state and flowing southeasterly into Chesapeake Bay. Its length is about 155 m., and it is navigable to Fredericksburg. Many events of importance occurred on or near its banks during the Civil War.

Raspberry, *Raz' ber y,* a thorny shrub of the Rose Family bearing a luscious, edible berry. The leaves are broad and sharply-lobed, the blossoms white and fragrant, and the fruit is really a compact cluster of juicy cells, known to the botanist as a multiple berry. The raspberry is easily grown in any moist, well-drained garden soil, and because its fruit ripens earlier than most other fruits they often prove a source of profit to the farmer. Like all fruits, a better quality is produced by careful pruning. After fruiting, the old canes should be removed and only the new ones allowed to remain. The berries are of two chief classes, the red and the black. The red are generally the larger and less seedy, but to many the flavor is less pleasing. The most popular varieties of red raspberries are the Cuthbert, the Shaffer and the Turner; of black raspberries, the Cumberland, the Gregg and the Kansas. In New York State, where raspberries are extensively raised, the fruit is dried and shipped in large quantities to Alaska. See BRAMBLE.

Rat, the typical representative of the Rat Family and found throughout the world wherever grains and vegetables may be raised. Its home was originally Mongolia, but it has traveled in grain-carrying vessels to nearly all parts of the globe. It is much larger than the mouse but has the same sleek coat, keen ears and hairless tail. It makes its home between partitions of houses, in barns and basements, or in the holds of ships. Its chief use to man is as a scavenger, but as it frequently carries off more grain than refuse and is also a carrier of disease, its usefulness is far overbalanced by its mischievousness. The bubonic plague, which is said to have killed over 2,000,000,000 people in the last 2000 years, is carried by rats as well as by

fleas and other insects. As the plague breaks out annually in the Far East and in tropical countries, ships from those countries are very liable to be unconscious carriers of the disease by bringing rats. The United States Government is at present conducting a hunting expedition which aims at the complete extermination of this pest. The Public Health and Marine Hospital Service has already spent $1,000,000 in the effort and is continuing the work at an expense of $14,000 monthly. Since the work of extermination has been begun in the West not one case of bubonic plague has been reported from Western ports. Vessels from infected countries entering all United States ports must be carefully fumigated and are obliged to protect their hawsers by shields over which the rats cannot climb.

The work of the government has brought to light the interesting fact that, although rats can go for only three days without food, they can go for months without water and not feel any ill effects therefrom. Rats are generally vicious when attacked but are tamable if taken young. White rats were once commonly sold as pets.

Ratich, *Ra tik',* **Wolfgang** (1571-1635), a German educational reformer, born at Wilster in Holstein. His fame rests upon his setting forth certain educational principles which, though in advance of his time, ultimately wrought material changes in the methods of teaching. He advocated teaching the mother tongue before foreign languages, especially Latin and Greek, which then took nearly all the time of the schools. He insisted that in teaching, the natural order of development of the mental powers should be followed and that science should have an important place in the course of study.

Rationalism, *Rash' un al iz'm,* (from Latin *rationalis,* pertaining to reason), a term used in philosophy and theology to denote any system which makes human reason the chief source of knowledge and its final criterion. It is opposed to sensationalism and empiricism. In philosophy, rationalism holds that the true method of knowledge is to discover by *a priori* reasoning the innate ideas or truths that lie at the base of all thinking (See A PRIORI AND A POSTERIORI). From these principles can then be deduced by logical reasoning the results that follow from them. Rationalism owes its origin to Descartes, and was especially influential in Germany and France; while empiricism found a more congenial home in England. The chief representatives of rationalism, besides Descartes, are Spinoza, Leibnitz and Wolff. Kant, in his *Critique of Pure Reason,* may be said to have destroyed the exclusive claims of rationalism and to have turned the current of philosophy into the channels of idealism and realism.

In theology, likewise, rationalism makes reason the final criterion. In the broad sense of the term, the rationalistic spirit is as old as the thinking mind, and all religions stand or fall by their ability or inability to commend themselves to man's reason. In a narrower sense, rationalism is used to denote the view which places human reason above the Bible or revelation as a source or test of religious authority. See PHILOSOPHY; EMPIRICISM.

Rattan', a name given to any of a number of long-stemmed plants of the Palm Family and grown extensively in India and tropical islands. Many have climbing, vinelike stems, which grow to lengths of several hundred feet and vary in diameter from a fraction of an inch to several inches. They are leafless except at the joints, where they bear slender stems of narrow, pointed leaflets. The rattan of commerce is prepared by cutting these stems into lengths of 5 to 20 ft. and binding them into bundles. The natives in localities where rattan is grown use it extensively in making ropes and mats. Europe and America import large quantities for use in the manufacture of furniture, baskets, walking sticks and the stalks of umbrellas and whips. It is a strong, flexible material, durable and combining some of the qualities of steel, wood and whalebone. The best rattan

comes from the Island of Borneo, and much is now produced in the jungles of the Philippines and in the vicinity of Singapore.

Rat'tlesnake", a name applied to several species of serpents of the Viper Family, found mostly in the United States and northern Mexico. The rattlesnakes are commonly long, heavy snakes, whose general color is black, relieved by diamond-shaped markings of yellow. Their distinguishing mark is the row of so-called rattles by which the tail is terminated. These rattles are hollow segments of horny skin, which form whenever the snake molts. This process does not occur annually, as is commonly supposed, but usually two or three times in the course of a year; hence it is impossible to tell the age of a serpent by the number of the rattles. The end rattle is the oldest and the smallest, for the diameter of each is the same as that of the body at the time of its molt, and each successive rattle forms next to the body. When the last-formed rattles are of about the same size, the snake is probably near maturity. The use of the rattles to the serpent is not known, but to man they are of value as a warning of the presence of a dangerous foe. The bite of the rattlesnake is poisonous and often proves fatal. Its effects may be counteracted by cauterizing the wound, but a physician should be summoned as quickly as possible.

Rauch, *Rouk,* **Christian Daniel** (1777-1857), a celebrated German sculptor, born at Arolsen. At the age of 13 he was apprenticed to the court sculptor of Prince Frederick II of Hesse. At the age of 20 he removed to Berlin, but was obliged to earn his living as a lackey and practice his art as he could. Some years later he went to Rome, where he was befriended by Thorwaldsen and other noted sculptors. His work soon attracted attention, and in 1818 he was commissioned to execute a monument for Queen Louise of Prussia. The statue, which represents the Queen in a sleeping posture, brought Rauch international fame, and the erection of many public statues was placed under his charge. His greatest work is the monument to Frederick the Great, begun in 1839 and unveiled in 1851. It is a colossal equestrian statue of the Emperor, with groups of his generals about the base. This work is considered one of the greatest masterpieces in modern sculpture. Rauch also made many busts of eminent men, among them that of Thorwaldsen for the King of Denmark, and a colossal bust of Goethe. Among his noted bronze statutes are a series of the heroes of the Napoleonic wars. In 1819 he founded a royal atelier of sculpture at Berlin. He was decorated with honors by princes, and the academies of Europe enrolled him among their honorary members. His life by Cheney is the best biography in English.

Ra'ven, a bird of the Crow Family. This large, black bird (about 25 inches long) resembles a large crow, but may be known by its greater size, the presence of loose fringelike feathers on the throat, and by its habit of sailing in the air, the crow doing more flapping while on the wing. In nest building the raven is a better architect than the crow, constructing a compact nest of sticks lined with grass and wool. Four to six greenish-brown or lavender-spotted eggs are laid. When hatched, the young are black and white in color. The raven's food is varied, including grain, insects, worms, field mice and even young birds. In winter ravens frequent the seashore or the vicinity of lakes and rivers, where they feed on dead fish or on anything which may have been cast upon the shore. This and related species are found in North America, Europe and parts of Asia. By nature ravens are cunning, mischievous and inquisitive, and if captured when young, they may become interesting pets. They are celebrated for their longevity, some being known to live for 70 or 80 years.

The weird, hoarse croak of the raven has caused it to be known the world over as a bird of ill omen, all sorts of calamities, including death, being ascribed to its presence by superstitious

people. The poet Poe has immortalized the bird in his poem *The Raven.*

Open here I flung the shutter, when, with many
a flirt and flutter,
In there stepped a stately Raven of the saintly
days of yore.
Not the least obeisance made he; not a minute
stopped or stayed he;
But, with mien of lord or lady, perched above
my chamber door,
Perched upon a bust of Pallas just above my
chamber door:
Perched, and sat, and nothing more.

Raw'linson, George (1812-1902), an English historian and Orientalist, born at Chadlington, Oxfordshire. He graduated with honors at Oxford in 1838, and subsequently received various high university appointments. In 1872 he became canon of Canterbury Cathedral, and from 1888 until his death was rector of All Hallows' Church, London. His writings include *Historic Evidence for the Truth of Christian Records, Manual of Ancient History, The Origin of Nations* and various histories of the monarchies of the ancient world.

Rawlinson, Sir Henry Creswicke, (1810-1895), an English soldier and Oriental scholar, born at Chadlington, Oxfordshire, England. He studied at Ealing, Middlesex, and entered the army when only 17 years of age. He was in the East India service and served in the Bombay presidency until 1833. He then went to Persia to assist in reorganizing the army of the shah. He was there six years and found time to study the ancient cuneiform inscriptions, made numerous important discoveries and translated the Behistun inscription of Darius. He then served in Kandahar and at Bagdad as political agent, was promoted to be consul-general in 1851 and returned to England in 1855. Four years later he went again to Persia as British minister. He was from 1871 to 1873 president of the Royal Geographical Society, and was knighted in 1891. His books are of great value to the world of scholars.

Ray. See ELECTRICAL FISH.

Read, *Reed,* **Opie Percival** (1852-), an American author and editor, born in Nashville, Tenn. After doing newspaper work in Franklin, Ky., he went to Little Rock, Ark., and edited the Arkansas *Gazette.* From 1883 to 1891 he had charge of the *Arkansas Traveler,* a humorous paper, and later removed to Chicago to engage in literary work. He has written *A Kentucky Colonel, Emmett Bonlore, A Tennessee Judge, My Young Master, Bolanyo, The Wives of the Prophet, In the Alamo, An American in New York, By the Eternal, Son of the Swordmaker* and *The Mystery of Margaret.*

Read, Thomas Buchanan (1822-1872), an American poet and artist, born in Chester County, Pa. His work as an apprentice to a tailor proved dull and he ran away, learned various trades, such as cigarmaking and sign painting, in Cincinnati, Philadelphia and other cities, and in 1843 he began to publish verse in the Boston newspapers. In 1850 he visited Italy and made Rome his permanent home for several years. He was fairly successful in painting and sculpture, but his best-known work is as a poet, and he is remembered for his charming poem *Drifting* and for the vivid *Sheridan's Ride.* A volume published in 1848 and entitled *Female Poets of America* was illustrated with engravings from his own pen. His other works include *Poems, Lays and Ballads, The New Pastoral* and *The House by the Sea.*

Reade, Charles (1814-1884), an English novelist and playwright, born at Ipsden House, Oxfordshire. He graduated from Oxford in 1835, received the degree of M. A. three years later, was made dean of arts at Magdalen in 1845 and vice-president in 1851. He was called to the bar in 1843, but soon turned his attention to literature. His play, *Masks and Faces,* written in collaboration with Tom Taylor, was later made into a novel with the title of *Peg Woffington.* In all his works there is a rapidity of movement, an abundance of incident, an insistence on the weaknesses and frailties of human life, resulting in an almost brutal point of view, and marked realism, mingled, however, with

a vein of sentiment. He was a moral satirist, exposing abuses and pointing the evils of the social system of his day. His works include *Peg Woffington, Christie Johnstone, It is Never Too Late to Mend, Hard Cash, Put Yourself in His Place, A Terrible Temptation, A Woman Hater* and *The Cloister and the Hearth.*

Reade, John (1837-), a Canadian journalist, born in Ballyshannon, Ireland. He studied at Queen's College, Belfast, and removed to Canada in 1856. Later he founded the Montreal *Literary Magazine* and became connected with the Montreal *Gazette.* In 1864 he was ordained a minister of the Church of England. Among the honors bestowed upon him was the election to the presidency of the Montreal Society for Historical Studies and to a fellowship in the Royal Society of Literature in Great Britain. His works are *The Prophecy and Other Poems, Language and Conquest, The Making of Canada, Literary Faculty of the Native Races of America, The Half-Breed* and *Aboriginal American Poetry.*

Reading, *Red' ing,* **Pa.,** a city and county seat of Berks Co., 59 m. n.w. of Philadelphia and 55 m. n.e. of Harrisburg, on the Schuylkill River, the Schuylkill Canal and the Pennsylvania, the Philadelphia & Reading, the Wilmington & Northern and other railroads. Nearly 104 m. of electric lines connect the city with flourishing suburban towns and villages. Numerous costly bridges span the river. Reading occupies an advantageous location commercially and has excellent transportation facilities. The city covers an area of six square miles and is situated within the Schuylkill and Lebanon valleys in an agricultural region in which there is great mineral wealth.

Parks and Boulevards. The city is regularly laid out and contains many miles of well-shaded and paved streets. Within the residential districts are many beautiful lawns and gardens. The park system comprises about 282 acres. Mt. Penn, a resort of great beauty to the east of the city, is encircled by an eight-mile "Switchback," or the Mt. Penn Gravity Railroad, terminating at Mineral Spring Park. The Neversink Mountain to the south of the city affords magnificent views at Point Lookout and is reached by an electric railway. On the neighboring hills are several hotels and sanatoriums. Penn Common, a park near the center of the city, contains a beautiful monument erected to the "First Defenders," to commemorate the fact that the "Ringgold Light Infantry," the first volunteer company to report for service in the Civil War, came from Reading. There is also a handsome monument to President McKinley and one to the volunteer fire companies of the city. Other resorts include Hampden, Triangle and Heston parks.

Public Buildings. Among the noteworthy buildings are the Berks County Courthouse, post office, city hall, Masonic Temple, Natatorium, 14 banks and trust companies, theaters, substantial business blocks and a Y. M. C. A. There are about 90 churches.

Institutions. The educational institutions include separate high schools for boys and for girls, several private schools, Schuylkill Seminary, a museum, the public and Berks County libraries, Reading Academy and the Berks County Historical Society. The charitable institutions include St. Catherine's Orphan Asylum for girls, St. Joseph's, the Homeopathic and the Reading hospitals, city and county orphanages, House of the Good Shepherd, Hope Rescue Mission for homeless men, Home for Widows and Single Women and St. Paul's Orphan Asylum for boys.

Industries. The chief industries of Reading are connected with iron and steel productions, but the coal mines and limestone quarries contribute to the prosperity of the city, which ranks third industrially among the cities of Pennsylvania. There are extensive blast furnaces, sheet-iron, boiler-plate and car-wheel works, tube works, railroad shops, paper and wood-pulp mills, cotton mills, hosiery mills, hat factories, knitting

mills, cigar factories, glass factories, potteries and manufactories of agricultural implements, fire brick, brushes, confectionery, braiding machines, bicycles, automobiles, steam engines, wrought iron, cordage, rope and twine, jewelers' supplies, safety razors, terra-cotta ware, gloves, silk goods, paints and varnishes and other manufactured products. There are also plants for the building of monuments.

HISTORY. William Penn originally owned the land upon which Reading is situated, by right of grant from King Charles II. Penn died in 1718 and devised the land to his children. In 1748 his sons, Thomas and Richard Penn, laid out the town and named it Reading after the county town of Berkshire, England. The first settlers were mostly Germans. During the War of Independence Reading was an inland station for supplies for the American army, and prisoners of war were sent here in large numbers. The development of the town dates from the opening of the Schuylkill Canal from Reading to Philadelphia in 1824. Reading was incorporated as a borough in 1783 and chartered as a city in 1847. Population in 1910, 96,071; 1920, 107,784.

Reagan, *Re' gan,* **John Henninger** (1818-1905), a United States senator, born in Tennessee. In 1839 he went to Texas, worked for several years as a surveyor, studied law, and received his license to practice in 1846. He was sent to the Legislature in 1847, and in 1852 was elected district judge. He was a member of Congress from Texas from 1857 to 1861. From 1861 to 1865 he was postmaster-general of the Confederacy; also, for a short time, acting secretary of the treasury. From 1875 to 1887 he was once more a member of the lower house of Congress from Texas, and was United States senator from 1887 to 1891, when he resigned to become chairman of the Texas State Railroad Commission. He was one of the authors of the Interstate Commerce Act, which became a law in 1887.

Re'alism (from Latin *realis,* pertaining to *res,* things), a term used in philosophy, literature and art. In philosophy it is used in two distinct senses: (1) in its older form, it was the Scholastic doctrine, opposed to nominalism, that universals have a more real existence than individual things; (2) in its modern form, realism, as opposed to idealism, is the doctrine that objects are "reals" which have independent existence apart from the perceiving mind, whether that of man or of God. It opposes any theory that would reduce the world to a system of ideas. See PHILOSOPHY; IDEALISM.

In literature and art the term is used to designate the attempt or tendency to represent facts exactly as they are, without "idealizing" them; and sometimes with the added implication of emphasizing the ugly and unsavory aspects of things as opposed to the beautiful or harmonious phases.

Real Property, or **Real Estate,** in law, immovable property, especially land, buildings and other permanent fixtures upon it, including timber and minerals. Real estate descends to the heirs of the deceased owner and is also subject to dower. Real estate can be transferred or encumbered only by written contract. See PERSONAL PROPERTY.

Real Schools, or **Realschulen,** *Ra ahl' shoo" len.* See EDUCATION, NATIONAL SYSTEMS OF, subhead *Germany.*

Reap'ing Machine, or **Reap'er,** a machine for cutting grain. It consists of a ground wheel from which the power is taken, a cutter bar against which the grain is bent by means of a raking device, a table upon which the grain falls, and a binder. The cutter is a movable steel bar upon which triangular knives are set. The bar, operated by the ground wheel, moves back and forth between the long steel rods, called fingers, attached to larger steel bars. There are several of these finger-set bars, or rakes, which are collectively known as a gathering reel. The cut grain falls upon a table, from which it passes by means of a canvas belt to the binding box. The box holds sufficient grain for one bundle, and when this is filled the binding apparatus

ties the bundle with binding twine and throws it upon the ground or upon a carrier arranged to hold the bundles, until there are enough for the shock or a stack, when the latest machines set the bundles in place on the ground.

This machine with all its appliances is now generally spoken of as a harvester, since it not only reaps the grain but prepares it for thrashing. The McCormick harvester, named for its inventor, Cyrus H. McCormick, is the type upon which all modern machines are built. They are generally drawn by four horses and are capable of cutting ten acres or more per day. American harvesters are known wherever grain is raised. Nearly 200,000 are manufactured in the United States annually. The harvester paved the way for the introduction of many other agricultural machines and implements, and their manufacture has become an extensive industry, having its chief center in Chicago. From that city alone nearly 50,000 car loads of agricultural machinery are shipped yearly. See Corn Harvester; Mowing Machine.

Rear-Admiral, a flag officer in the navy. In the United States navy, rear-admirals are of two ranks, the first nine and all others. The first nine rank next below vice-admirals and next above the other rear-admirals, and with major-generals in the army; their flag, which is flown from the mizzen, has two stars; their salary is $8000 per year, with $800 more per year while at sea. Their salute is 15 guns. Other rear-admirals rank with brigadier-generals in the army; their pay is $6000 per year on shore and $6600 at sea; their salute is 13 guns. See Navy.

Reason, *Re' z'n,* the guiding powers of the mind. Just as in forming a judgment, two concepts are compared and seen to agree or differ, so in reasoning two judgments are brought together and from them a third is drawn. The process is called reasoning. In modern psychology there is no special faculty called the reason, but rather, in the mind there are numerous, separate acts of reasoning. Reasoning is the last of the three processes in thinking and is considered the highest of the three. Its ability in any instance depends upon the power of forming accurate judgments and logically connecting them.

Reasoning may be inductive or deductive; the former is the natural method and consists in forming inferences by the examination of manifold individual cases (See Inductive Method). Deductive reasoning, on the contrary, proceeds from general rules to concrete instances (See Deductive Method). The reason is the last power of the mind to develop, and it is the ability of developing it to a high degree that lifts man above the lower animals. See Syllogism; Judgment; Logic.

Recall'. See Initiative, Referendum and Recall.

Receiver, *Re seev' er,* a disinterested person appointed by a court of equity to take charge of property or a business under litigation, or of property left to incompetent supervision. An example of the latter case would be property left to an infant or an insane person without a proper guardian. A receiver is sometimes appointed to wind up the affairs of an insolvent business. In such case he must proceed according to the insolvent laws of the state. In other cases he is under the direction of the court. A receiver cannot sue or be sued except by permission of the court. In some cases his duties consist in managing the business, and he is then expected to keep down expenses until the concern again becomes solvent. Receivers of railroads are appointed for this purpose.

Reciprocity, *Res" i pros' i ty,* a term commonly applied to the arrangements or concessions between the people of two nations with respect to commercial privileges each country shall enjoy in trade with each other. Reciprocal relations are established by treaties which provide that one country shall admit through its ports of entry certain commodities from the reciprocating nation, free of duty, or under reduced tariff, in return for similar concessions on other articles which it exports. The

reciprocity system sprang up as a means of relief from the old navigation laws and was gradually extended, not only to tariff duties, but to general matters of commercial privileges as well. The first real experiment in reciprocity made by the United States is found in the Canadian Treaty of 1854. This stimulated trade, but its popularity received a blow in the crisis of 1857, which reduced both imports and exports of the United States, resulting finally in the abrogation for the treaty in 1865. During the decade 1880-1890 reciprocity first began to be advocated in the United States as a definite tariff policy, as events have proven that tariff arrangements, if judiciously settled, benefit trade and are practically necessary under present conditions of commercial intercourse between nations. See TARIFF.

Reconstruc'tion, the process by which the Confederate States were restored to the Union after the Civil War. There were three views concerning the political status of these states. President Lincoln and his cabinet held that the act of secession was not passed by any state, but by disloyal citizens of the state, and that the state was still a member of the Union and that its relations to the Union could be restored by the renewal of its obligations to the Constitution. The President also held that, since the pardoning power was solely his prerogative, it rested with him to decide when a seceding state should be restored to its former relation.

One faction in Congress, led by Charles Sumner and Thaddeus Stevens, held that the states which had seceded were conquered territory, that by the act of secession they had entirely severed their connection with the Union and that they should be required to frame new constitutions, and as soon as possible apply for admission to the Union. The third view, and the one which finally prevailed, required the states which had passed the ordinances of secession to place themselves under the control of the National Government to be dealt with by Congress.

A committee of Congress was appointed to formulate a plan. The plan presented and adopted called for the formation of the Freedmen's Bureau (See FREEDMEN'S BUREAU); the establishment of governments in each of the states; the support of these governments, wherever necessary, by military force; and invitation to each state to frame and adopt a new constitution, and to adopt the Fourteenth and Fifteenth amendments. Congress was to be the judge of the conditions which would enable the state to be restored to the Union. In many instances the readjustment of affairs was so conducted as to cause unnecessary hardship to the South. The period of reconstruction extended over ten years and was brought to a close in 1877, when President Hayes ordered the withdrawal of the troops from the Southern States. See CIVIL WAR IN AMERICA; CARPETBAGGERS; KU-KLUX KLAN.

Red. See COLOR, THEORY OF.

Red Bane'berry, a plant of the Crowfoot Family and belonging to the baneberry genus. It has parted leaves and slender stems, with clusters of small white flowers. It is found throughout the northern part of the United States. The red baneberry bears clusters of bright red berries. Another variety of the same species bears white berries.

Red'bird". See TANAGER FAMILY, subhead *Summer Tanager;* CARDINAL.

Red Cross Society, a society organized to provide relief for the sick and wounded in war. An international conference first met at Geneva, in October, 1863, as a result of a movement begun by M. Jean Henri Dunant, a Swiss, who had been successful in interesting the Swiss Federal Council in the work. Over 40 nations have now joined the association. The national society established in the United States in 1881 was, for a long time, under the management of Clara Barton. She extended the scope of the relief work and arranged for giving assistance to the needy in public calamities other than war. In 1905 a special act of Congress dissolved

the society then existing, and incorporated a new organization to operate under government supervision. The badge of the society is a red Maltese cross on a white background; the banner bears the words, *Faith, Hope and Charity*. The president of the United States is president of the Red Cross Society in this country. See BARTON, CLARA.

Red Jack'et (1751-1830), a celebrated chief of the Seneca Indians. His real name was Sagoyewatha. He obtained

RED BANEBERRY

his English name because of the pride he took in a scarlet jacket presented to him by a British officer after the Revolutionary War. He assisted the British during the Revolution, but aided the United States in the War of 1812. He made an eloquent plea against the Treaty of Ft. Stanwix in 1784, by which the Iroquois ceded some of their land to the United States. He lacked courage as a warrior, but was a wise statesman and one of the greatest orators the Indian race ever produced .

Red'lands, Cal., a city of San Bernardino Co., in the southern part of the state, 62 m. e. of Los Angeles, on the Southern Pacific and the Atchison, Topeka & Santa Fe railroads. The Pacific electric lines also connect the city with San Bernardino, the county seat, Smiley Heights, Prospect Park, Terracina and Mentone. Redlands is famed for its scenic beauty and is one of the most attractive cities of the state. The city contains wide and beautifully paved streets, and there are many elegant residences. Among the attractions of the city are the A. K. Smiley Public Library, Y. M. C. A. Building, numerous handsome churches, the Redlands High School and Kingsbury Grammar School, the Ladies' Contemporary, Masonic, Elks' and University club buildings, the Hotel Casa Loma and the University of Redlands (Baptist), with four splendid buildings. This university also has plans for an additional 11 buildings to cost about $500,000.

Redlands is an important market and shipping center and is situated in one of the largest orange-growing sections of the country. Apples, grapefruit, peaches and small fruits are also extensively grown. Dry-farming is carried on in the country surrounding the city, barley, oats, alfalfa and wheat being grown. The first settlement was made in 1881 by people from New England. A city charter was granted in 1887. Population in 1920, U. S. census, 9571.

Red River, a river of the United States. It rises in the northern part of Texas, flows eastward into Arkansas, then southeastward across Louisiana until it enters the Mississippi 341 m. above its mouth. It forms a portion of the boundary between Texas and Oklahoma. Its length is about 1550 m. and it is navigable for 1250 m. In the upper part of its course it flows through a canyon from 500 to 800 ft. deep. Before entering the Mississippi it forms a number of bayous.

Red River of the North, a river rising in the northern part of Minnesota within a few miles of the sources of the Mississippi. It flows southward, then westward until it reaches the boundary of North Dakota, when it turns northward and continues this course until it enters Lake Winnipeg. It forms almost the entire boundary between Minnesota and North Dakota. Its chief tributaries are the Red Lake River from the east and the Assiniboine from the west. It is about 700 m. long. Formerly steamers ascended the river as far as Fargo, N. D., and some boats are still found on the lower part, but since the construction of railways it has little importance as a waterway. The valley of this river is a part of the bottom of ancient Lake Agassiz.

Red Sea, or **Ara'bian Gulf,** a body of water between northeastern Africa and Arabia, connecting with the Indian Ocean through the Strait of Bab el Mandeb, and with the Mediterranean Sea through the Suez Canal. The Gulf of Akabah lies at its northern extremity, penetrating into Arabia; between Arabia and Egypt is the Gulf of Suez, more shallow than the Gulf of Akabah. The Egyptian shores are wide sandy plains in the north; farther south they rise to table-lands until they reach the mountains of Abyssinia. The Arabian shores are sandy deserts. Coral reefs line either side, particularly the eastern. The Dahlak Islands lie near Africa; the Farsan, near Arabia. The average depth of the sea is 2000 ft.; the maximum depth of the central channel is 7500 ft. Evaporation is rapid, the heat is intense and the atmosphere of the vicinity is depressing. The principal ports on the Arabian side are Mocha, Hodeida and Jidda. On the Egyptian coast are Suez, Suakim, Massowa and Kosseir. The Red Sea was the commercial highway between India and the trading population on the shores of the Mediterranean. The opening of the Suez Canal in 1869 restored its importance as a commercial route, which it had lost by the discovery of the route around the Cape of Good Hope.

Red'start", a bird of the Wood Warbler Family. The American redstart is smaller than the canary and is an inhabitant of damp woodlands, where it may be seen flitting among the trees in its search for insects. The body of the male is a lustrous blue-black; the lower parts are white; and the breast is orange-red; the end of the tail is black, but the basal part of the tail feathers and of the wing feathers are orange-red. In the female the head is gray and the body is yellowish. The cup-shaped nest is usually placed in the crotch of a tree at a height of from 5 to 30 ft. above the ground, and is composed of fine dried grass, plant down and strips of bark, and is lined with fine grass and hair. It contains three to five spotted eggs.

The redstart spends the summer in the United States and Canada, migrating in winter to Cuba, Mexico, the West Indies and northern South America.

Red Wing, Minn., a city and the county seat of Goodhue Co., about 40 m. s.e. of St. Paul on the Mississippi River at the upper end of Lake Pepin, and on the Chicago, Milwaukee & St. Paul, the Chicago Great Western and other railroads. A high bridge spans the river at this point. The city is an important wheat market and shipping center. Its manufactures are extensive and include sewer pipes, stoneware, brick, boats, gasoline engines, furniture, lumber products, shoes, hats, lime, linseed oil, soft drinks, flour and iron. Red Wing has, among other educational institutions, the Hauge and Lutheran seminaries. In the vicinity is located the state training school for boys and girls. Other features of the town are a Federal Building, the T. B. Sheldon Memorial Auditorium, in connection with which there is a school of music, a municipal theater, a city hospital, St. John's Hospital, a Y. M. C. A. Building and an old ladies' home. The first white settlement on the site of Red Wing was made in 1837 by two Swiss missionaries, Samuel Denton and Daniel Gavin. The place was platted in 1853 and chartered as a city in 1857. The name is that of

an Indian chief. Population in 1920, U. S. census, 8637.

Red'wood", a name given to a number of trees of different families, chiefly because of their red heartwood or the red dye which they produce. The various redwoods are brazilwood, sapan wood, camwood, logwood and sandalwood, all of which are hard and resinous and may be employed in cabinetwork. Mahogany, Scotch pine, buckthorn and the European dogwood are locally called redwood. In the United States, the redwood of California is the sequoia, an immense forest tree, valued for its size and beautiful lumber. See CAMWOOD; SEQUOIA; SANDALWOOD.

Reed, Thomas Brackett (1839-1902), an American statesman, born at Portland, Me. He graduated from Bowdoin College in 1860, studied law, and commenced practicing in Portland in 1865. The Civil War called him to the navy as paymaster for a year, when he returned to his practice and was elected to the State Legislature of Maine. In 1876 Mr. Reed was elected to the United States Congress, where he served for 22 consecutive years, being chosen speaker of the House at three different times. He gained the title of "Czar" by requiring that those present who refused to vote on a question, in order to prevent a quorum, should be counted. This ruling caused hot discussion, but was sustained by the Supreme Court. He was elected to Congress again in 1899, but resigned to resume the practice of law in New York City.

Reed'bird". See BOBOLINK.

Ref"eren'dum. See INITIATIVE, REFERENDUM AND RECALL.

Reflec'tion of Light. See LIGHT, subhead *Reflection of Light.*

Re'flex Action. A reflex act may be defined as an act in which a movement is made in immediate response to stimulation of a sense organ without the interposition of consciousness. Some reflex acts are entirely unconscious, while others are performed without the aid of consciousness. Among the former are such acts as the dilation of the pupil of the eye in darkness; of the latter are such movements as closure of the eyelids and sneezing, in which we sometimes take cognizance of the act and sometimes do not. Reflex acts are the means by which the creature protects itself from immediate dangers that assail it from the world without and adjusts itself to environment. Many of the lower animals, which must provide for themselves from the time of birth without parental care, begin life with a large number of reflexes, which enable them to perform effective movements of accommodation to environment from the start. Thus the stimulus of water on the body of the tadpole excites swimming movements.

The higher in the scale of development the animal species, the fewer are its reflexes at birth and the longer the period of infancy in which the reflexes are established. The child is provided at birth with a limited number of rudimentary reflexes, such as crying, sucking and clasping of the fingers; others follow after a few days, and winking after several weeks, and so on; while the reflexes necessary for walking do not come until the end of 12 or 18 months. Although some reflexes are of a nature injurious to the organism, most reflexes are reactions of the organism having a tendency to self-preservation, such as involuntary clutching movements in falling. In some animals the mechanical reaction to stimuli may continue after the brain has been removed, an indication that such movements are not controlled by that organ. See NERVOUS SYSTEM.

Ref"orma'tion, The, the religious and political movement in the 16th century which originated Protestantism. It was at first an attempt to reform certain recognized abuses in the Roman Catholic Church, but resulted in a break with that body on the part of the reformers and formal separation from it. Religious in its origin and animating spirit, the movement became involved in political controversies, which plunged Europe for many years into civil strife and bloody

warfare. The Reformation wrought a radical change therefore in both the religious and political life of Europe.

Causes. The causes of the Reformation were both general and specific. In its general aspects, the Reformation was one part of the great intellectual movement that, in the last half of the 15th century and the first years of the 16th, marked the transition from the Middle Ages to modern civilization. It was a product of the new spirit which in all departments of life was turning from the forms of knowledge handed down by the past, and was seeking truth for itself at first hand by studying the actual world about it and exploring lands, hitherto unknown, beyond the seas. When this spirit, with its passion for reality, turned to the realm of religion, it was not satisfied with the traditional forms and ceremonies and the priestly Church organization that it found, but demanded reality of a more immediate kind here also. The Reformation therefore was but the introduction into the religious realm of the same process that was going on in other departments of life.

In another aspect, the Reformation was a conflict between the Germanic spirit of individualism and the old Latin spirit of organization and unity. Politically, it was a revolt of the new spirit of nationalism against the temporal supremacy of the Papacy. Another cause is to be found in the revival of learning, which quickened the awakening mind of Europe. One fruit of the new learning was a new translation of the Bible into the language of the common people in Germany, France, Sweden and England, while the newly-invented art of printing scattered these translations broadcast. The Bible was thus brought as a new book to the masses of the people, and directly paved the way for the spread of the Reformation doctrines. Other German translations had long been in existence, but Luther's became the standard for the German Protestants, among whom it occupied practically the same position as that of the King James Version among the English.

REFORMATION, THE

The Reformation in Germany. The specific cause, or immediate occasion, of the Reformation was the offer of papal indulgences to all who would contribute funds toward the completion of St. Peter's Church in Rome. Martin Luther, a parish priest and professor of theology in the University of Wittenberg, was aroused by the way in which this work was carried on by Johann Tetzel, who had charge of it in Saxony. On Oct. 31, 1517, Luther nailed to the church door at Wittenberg his famous 95 theses, which, greatly to his surprise, caused an immediate uproar throughout Germany. His intention was to reform certain abuses within the Church, not to break with it. But the die was cast. In defending his position, he advanced step by step until he declared that the Papacy was only a human institution, and that some of its fundamental teachings were erroneous. Pope Leo X issued against him a bull of excommunication which, together with a copy of the canon law, Luther publicly burned, thus severing his connection with the Church.

In 1521 he was summoned to the Diet of Worms by Emperor Charles V, but refused to retract, and was put under the ban of the empire. He now began the constructive work of the Reformation by translating the Bible into vigorous idiomatic German. The movement was for a time endangered by the extremes to which certain of its advocates went and by the peasant uprising, but these were suppressed with Luther's assistance. The Emperor, from first to last opposed to the Reformation, was occupied with his foreign wars, and the new ideas spread apace, many of the North German princes siding with Luther. In 1526 these united in the League of Torgau, and at the Diet of Spires in the same year the Lutheran reform received legal recognition by a decree leaving each state free to exercise its own discretion. Churches were organized in many Lutheran states, the new doctrines were widely preached, and Luther wrote a catechism designed especially for the education of the young.

At a later Diet of Spires in 1529, further progress of the Reformation was prohibited. The Reformers protested against this action, and thereby received the name Protestants. The next year, at the Diet of Augsburg, they set forth their views in the Augsburg Confession, prepared by Melanchthon. But no agreement could be reached with the Church party, which passed a decree condemning Protestantism. The Protestants then organized the League of Schmalkald for protection, the Catholics formed an opposing league, and the war waged with varying fortunes until 1555, when the Peace of Augsburg provided that each prince should decide for himself the religion of his state and people. This still left seeds of discord which in the following century bore fruit in the Thirty Years' War, settled by the Peace of Westphalia in 1648.

In Switzerland. Meanwhile a parallel but independent reform movement was in progress in the German cantons of Switzerland, under the leadership of Ulrich Zwingli, pastor at Zürich. His plea was for a Church that should sanction only the doctrines and practices contained in the New Testament. In this respect he was much less conservative than Luther, who desired to retain all the ceremonies and doctrines of the Roman Catholic Church that were not considered to be contrary to the New Testament. A conference was arranged between the two men at Marburg in 1529, but they could not reach an agreement with reference to the Lord's Supper, and this difference led to a division of the Protestant forces which has never been healed. The Catholic cantons in Switzerland now combined against the Swiss Protestants, and in the resulting warfare Zwingli was slain (1531).

Of much greater importance was the Reformation in French Switzerland under John Calvin, who joined Farel at Geneva in 1536. Calvin was the theologian and organizer of the Reformation. His *Institutes of the Christian Religion,* which had just been published, became the handbook of doctrine. He organized the Church at Geneva on the Presbyterian model, and built up a religious community which became the haven for Protestant refugees from all over Europe, who returned home full of enthusiasm for the doctrines of Calvin and the Genevan form of ecclesiastical government.

In Denmark and Sweden. The Reformation was introduced into Denmark and Sweden by pupils of Luther and made rapid progress. Gustavus Vasa, King of Sweden, took the lead in that country and declared himself supreme in ecclesiastical affairs; and at the Diet of Westeräs (1527) the estates of the realm sanctioned the confiscation of the monasteries and unanimously adopted Lutheranism. The last remnants of Catholicism were abolished at a second Diet of Westeräs in 1544. In Denmark also the initiative was taken by King Frederick I, and Roman Catholicism was abolished at an assembly of the Danish states in 1539.

In Netherlands. The close relations of Netherlands with Germany led to the early introduction of the Reformation into these Spanish provinces. Charles V made severe laws against the new movement in vain, and his successor, Philip II, introduced exceedingly repressive measures, sending the Duke of Alva to execute his decrees. Philip also took away the ancient political liberties of the realm. The people rose in revolt, and under the leadership of William, Prince of Orange, finally established the Dutch Republic (1579), which became permanently Protestant. The southern part of Netherlands, or Belgium, remained Catholic and subject to the Spanish Crown.

In France. The Reformation took a strong hold upon the upper and middle classes in France, where King Francis I was inclined to favor a movement so likely to embarrass his rival, Charles V. The Reformers were also aided by the sister of Francis, Queen Margaret of Navarre. But the peasantry presented a united front against the movement, which therefore assumed something of the character of a class controversy and was greatly hindered thereby. Severe

persecution of the Reformers early developed, and many of the leaders fled the country. Nevertheless, the New Testament was translated into French, and the Huguenots, as the French Protestants were called, made considerable progress, 2000 churches being established by 1558. But here also the movement became complicated with political and personal issues and lost its strength after the massacre of St. Bartholomew (Aug., 1572). France remained Catholic, although toleration was secured for the Huguenots in the Edict of Nantes (1598).

In England and Scotland. The Reformation in England was at first only indirectly connected with the movement in Germany, and was a personal and political revolt against the temporal supremacy of the Pope on the part of Henry VIII. The Pope refused to grant Henry a decree of divorce from Catharine of Aragon, and the King declared his own supremacy in Church as well as in State and secured the divorce through his own courts. Henry, however, had little interest in the religious aspects of the new movement; but the soil had been prepared for a more popular reformation by the work of John Wiclif and the Lollards, by such representatives of the new learning as Colet, More and Erasmus, and by the prevalence of ecclesiastical abuses. The writings of Luther and Tyndale's translation of the Bible found eager readers. A third party arose which rejected the doctrines of Catholicism as well as its authority.

With the accession of Edward VI, in 1547, the Reformation advanced still further toward the position of the Continental Reformers. Under the Catholic Mary, who came to the throne in 1553, Catholicism was temporarily reestablished; but with the coronation of Elizabeth in 1558 there was a return to the policy of Henry VIII, the Act of Supremacy made the sovereign the head of the Church, and the Forty-two Articles adopted in Edward's reign, reduced to Thirty-nine Articles, established Protestantism permanently as the State religion of England.

In Scotland the Reformation assumed the Calvinistic type of Geneva. Patrick Hamilton and, after him, George Wishart, were the forerunners of John Knox, through whose influence, by 1560, the new faith had become firmly established. Episcopacy, as well as Catholicism, was abolished, and the Reformed Church was set up with the Presbyterian form of government.

In Other European Countries. In Italy and Spain, as in France, the Reformation did not appeal to the masses of the people. While it gained a foothold among the upper and middle classes, even here it limited itself to the advocacy of reforms within the Church and did not seriously menace the supremacy of the Pope.

Bohemia had already been made practically a Protestant country by John Huss a century earlier, and its inhabitants were quick to accept the Reformation. In the wars that followed, however, and especially in the Thirty Years' War, Protestantism was practically crushed out, and the country returned to Catholicism. In Hungary and Poland the rivalries between Lutherans and Calvinists, intensified by differences of race, hindered the progress of Protestantism and enabled Catholicism to hold its own.

Results. There were many loyal Catholics who were opposed to the abuses in the Church that had given rise to the Reformation. The progress of Protestanism made it all the more imperative that something should be done to stem the tide. A reform movement was therefore undertaken within the Church itself, known as the Catholic Counter-Reformation. The Council of Trent, with its discussions and decrees, exercised a reformatory influence and defined more clearly the doctrines of the Church. Most important of all, the new Order of Jesuits sent its missionaries everywhere and did much to rekindle enthusiasm for the old Church.

Protestantism emerged from the conflict united in a few fundamental doctrines, chief of which were those of justification by faith, direct access to God

through Christ without mediation of Church or priest, and the supreme authority of the Scriptures in Christian life. Differences concerning the sacraments and other points of doctrinal belief divided Protestants, however, into two main schools—Calvinists, with whom the followers of Zwingli joined, constituting the various branches of the Reformed Church; and Lutherans, composing the Lutheran Church.

The close of the Reformation left Catholicism in possession of the nations of southern Europe, where the Latin races predominated; and saw Protestantism firmly established among the Germanic peoples of northern Europe. In these countries a new spirit of nationalism was awakened, a new love of liberty was kindled, and new religious enthusiasms were engendered, which have greatly influenced the course of modern history and have produced a civilization of their own.

See LUTHER, MARTIN; CALVIN, JOHN; ZWINGLI, ULRICH; MELANCHTHON, PHILIPP; WILLIAM OF ORANGE; HENRY VIII; ELIZABETH; HUGUENOTS; THIRTY YEARS' WAR; KNOX, JOHN; CHARLES V; PHILIP II.

Reformed Epis'copal Church, a religious body organized in New York City, 1873, by certain members of the Protestant Episcopal Church (See EPISCOPALIANS), who were desirous of establishing a church more evangelical in its teaching than the Mother Church. Its organizers had been identified previously with the Low Church Party. The Reformed Church is episcopal in administration and retains the ritualistic form of worship, but has rejected those teachings which are closely akin to Roman Catholic doctrine. In 1911 there were in the United States 94 clergymen, 80 churches and 9610 communicants.

Refrac'tion of Light. See LIGHT, subhead *Refraction of Light.*

Refrigeration, *Re frij" er a' shun.* See COLD STORAGE.

Regelation, *Re" je la' shun.* When two pieces of ice or a piece of ice and some other body are firmly pressed together, the parts of the ice in contact and under pressure have their melting temperature slightly lowered, and consequently absorb heat from the near-by slightly warmer ice, and melt. On the pressure's being relieved, the film of water previously formed at once gives up its heat to the surrounding slightly cooler ice, and freezes. This process is called *regelation.* It can be simply illustrated by suspending a heavy weight by a fine wire loop hung over a block of ice at 0° C. In a short time it will be observed that the wire has cut far into the block of ice and that the path it followed is frozen solid. The flow of great masses of ice in the form of glaciers, the "packing" of snowballs and like phenomena may be explained as due to regelation. See FUSION; GLACIER.

Regiment, *Rej' i ment.* See ARMY, UNITED STATES, subhead *Regiment.*

Regina, *Re ji' na,* a city of Canada, capital of the Province of Saskatchewan, situated 357 m. w. of Winnipeg, on the Canadian Pacific and Canadian Northern railways. Surrounding the town is a rich agricultural region, and Regina is a political and educational center, containing the government building of the province, the provincial normal school and an adjoining Indian industrial school. It is also the headquarters of the Northwest Mounted Police. The manufactures include agricultural implements, sash and doors, soap and brick. It is an important distributing point for the branches of the Canadian Pacific and the Canadian Northern railways. Population in 1911, 30,210.

Reg"istra'tion, a requirement designed to prevent illegal voting. In order to prevent persons who have not the right of franchise from voting, and others from voting more than once in their own precinct, and from voting in more than one precinct, nearly all states have stringent registration laws. Previous to election, at a time stated by law, each voter is required to appear before the election board in his precinct and reg-

ister under oath his name, address, nationality and the length of his residence in the state, county and precinct. At the time of election another register is kept for comparison with the first. Severe penalties are usually provided for violations of the law. In large cities registration is required more frequently than in small towns, usually before each general election.

Reg'ulus, Marcus Atilius, a Roman general and patriot, consul in 267 and in 256 B. C. During the First Punic War he took an army to Africa, and in a sea fight completely conquered the fleet of Carthage, but was captured by the Carthaginians the following year. Later the rulers of Carthage sent him to Rome to arrange terms of peace, placing him under oath to return. According to the story, probably legendary, he urged his compatriots to continue the war, but he returned to Carthage in fulfillment of his oath and suffered death by torture.

Reid, *Reed,* **George Agnew** (1860-), a Canadian painter, born in Ontario. He studied art in Philadelphia, France, Spain and Italy, and excels as a figure painter, although he has exhibited many landscapes. His *Dreaming* and *Mortgaging the Homestead* are in the Ottawa National Gallery, and he has decorated a portion of the new city buildings of Toronto. Besides being the recipient of numerous other honors, he was a fine arts juror of award at the Pan-American Exposition of 1901.

Reid, Mayne (1818-1883), an Irish author, born at Ballyroney. He came to the United States in 1840, and, after an unsettled career, joined the United States army, distinguishing himself at Chapultepec during the Mexican War. In 1849 he settled in London, where he produced a number of famous books for boys. They include *The Rifle Rangers, The Scalp Hunters, The Boy Tar, The Headless Horseman* and *The War Trail.*

Reid, Thomas (1710-1796), the founder of the Common Sense School of Scottish philosophy, born at Strachan, Kincardineshire. He graduated at Marischal College, Aberdeen, in 1726, and in 1737 became pastor of the parish Church of New Machar, in Aberdeenshire. He was appointed professor of philosophy in King's College, Aberdeen, in 1752, and 11 years later he succeeded Adam Smith as professor of moral philosophy at the University of Glasgow. Reid's philosophy, representing a revolt from the skeptical conclusions of Hume's *Treatise of Human Nature,* consisted in an appeal to the common sense instincts or intuitions of the plain man as the ground of philosophical belief in the realm of nature and experience. The school exercised a considerable influence on Scottish and English thought.

Reid, Whitelaw (1837-1912), an American journalist and diplomat, born in Xenia, Ohio. Shortly after his graduation from Miami University in 1856, he became editor of the Xenia *News.* At the beginning of the war he was made Washington correspondent of the Cincinnati *Gazette,* writing over the signature of Agate. He served for three years as librarian of the House of Representatives. In 1866 he settled in Louisiana as a cotton planter, and while there wrote a book entitled *After the War.* Two years later he completed *Ohio in the War,* the most important of all the state histories of the Civil War. Upon the death of Horace Greeley in 1872 he became editor and owner of the New York *Tribune,* to which he had been contributing for six years. After 1889, when President Harrison appointed him minister to France, he represented America in foreign lands upon a number of important occasions, and in 1905 was appointed embassador at the English court. One of his most important acts as a public official was his serving on the peace commission which met at the close of the Spanish-American War.

Reindeer, *Rane' deer",* an Arctic member of the Deer Family found in Siberia, northern Europe and America. It is a large, heavy animal, but extremely swift and strong and of great value to the Northern peoples, whose lives practically depend upon their herds. In color, the reindeer is, in summer, dark brown,

marked with white upon the nose, neck and rump and above the hoof, but in winter this changes to a lighter shade; the fur is coarse but very thick, and is especially long upon the underside of the neck.

The antlers are borne by both sexes and are dropped by the old males in the fall, but are retained by the young bucks

REINDEER

and the females until spring; these antlers are broad and divided in the older males into numerous prongs, two sets of which extend forward, and two, the larger, back and upward, forming a noble frontlet.

The reindeer feeds upon lichens, reindeer moss and other Arctic vegetation, which it digs from under the snow by means of its sharp hoofs and shovel-like antlers. The reindeer has been domesticated by the Laplander and is to him what the camel is to the people of the desert; living, it carries his burdens, draws his sledges and furnishes milk for the table and for the preparation of the exported Lapland cheese; dead, its flesh, marrow and tongue furnish food; its horns and antlers, implements, knives and dishes; its tendons, thread and thongs; its hide, leather, tent cloth and clothing. Because of the many ways in which it is valuable to man, the reindeer has been introduced into Alaska by the United States Government and is proving very useful there. The caribou, which inhabits northern America, is by some authorities classed as a variety of reindeer; others consider it a distinct species of the same genus. See CARIBOU.

Religion, *Re lij' un.* The origin of the Latin word *religio* has been in dispute since the days of Cicero. More important than the origin of the word, however, is the meaning of religion. A satisfactory definition is difficult to find because of the complexity and peculiar character of the phenomena involved and because of the necessity of including all forms of religion from the lowest to the highest. In general terms, religion is the recognition of a supernatural or superhuman being or beings on whom we are dependent, or to whom we are related; together with the beliefs, experiences and activities that spring out of the recognition of this relationship.

Religion is primarily a sentiment or feeling, an inner life or attitude in reaction to belief in the supernatural. As this becomes the object of reflection, and the character of the supernatural is investigated, beliefs and theories take more definite form, and develop in the course of time into theology, which is the science of religion. The religious life expresses itself, moreover, in forms of workship, in rites and ceremonies, that is, in a cult. Religious beliefs also find expression in the customs, relationships and duties of individuals and of communities, thus bearing fruitage in morality, of which it is the vital spirit. It must not be supposed, however, that these various elements are always consciously distinguished from each other in the religious life, especially among primitive peoples.

The scientific and historical study of religious phenomena, known as *comparative religion,* is of recent origin, dating from the 19th century. This method undertakes the investigation and description of all religious facts, going far back to the primitive conditions of early human life; the origin and development of the various religions that have appeared in the course of history; and a comparison of the phenomena involved, with a

view to discovering if possible what the real nature of religion is. The results up to the present time indicate that religion is universal. No group of people has been found, however savage or primitive, among whom some form of religion does not exist.

The materials for this study have greatly multiplied in recent years, due to the results achieved by the sciences of anthropology and ethnology and the reports of travelers and missionaries who have penetrated to every corner of the globe. Among the many classifications of religion, as a result of the study of this material, perhaps the most satisfactory is the fourfold division of Jastrow into religions of savages, of primitive culture, of advanced culture, and "those religions whose conscious ideal is the coextensiveness of religion with life and complete harmony between the doctrines and the practices of religion."

The religions of savages are almost impossible to determine, from the fact that it is doubtful whether any races now exist which are uninfluenced by culture. *The religions of primitive culture* are represented by those of Polynesia, Australia, the natives of Africa, some of the Hindus, the ancient Teutons and those of Mexico and Peru. These are all characterized by the worship of personified objects of nature and the spirits of departed ancestors, accompanied by magical rites.

The religions of advanced culture include those of Egypt, Babylonia and Assyria, China, India (exclusive of Buddhism), Greece and Rome. While there are wide differences among these, they are all characterized by the predominance of mythology over the magical worship of nature. This involves the power of abstract thought and indicates a higher degree of culture. An advance is also noticeable in the priesthood. The priests are no longer simply mediums between men and the gods, as in the primitive religions, but attain a more ethical function and serve also as custodians of morals, indicating that religion is becoming more intimately related to life.

Religions coextensive with life continue this tendency. They include Judaism, Buddhism, Zoroastrianism, Mohammedanism and Christianity. These religions represent a conscious effort to harmonize doctrine with practice and to make religion inclusive of all life. They are more spiritual in character, superstition bears a less important part, and the priest and the cult are less influential. They are distinctly missionary in character, regarding all lower forms of religion as false and attempting their extinction. Moreover, they are mutually exclusive, each one of the five believing itself to be the only true religion and seeking to gain for itself world-wide acceptance. Three of them, Buddhism, Mohammedanism and Christianity, already number among their adherents the greater part of the earth's inhabitants.

Judaism, Mohammedanism and Christianity are monotheistic religions, believing in one God. All others are polytheisms, having a multiplicity of deities. Even among some of these, however, there is observable a tendency, especially on the part of their philosophers and thinkers, to the recognition of one deity back of the others and supreme over all. See BUDDHISM; ZOROASTRIANISM; MOHAMMEDANISM; JUDAISM; CHRISTIANITY.

Rembrandt, *Rem' brant,* properly **Rembrandt Harmensz van Rijn,** (about 1606-1669), the greatest master of painting and etching of the Dutch School, was born at Leyden, the son of a prosperous miller. Only a few facts of his life are known and their authenticity is disputed. He studied with Jacob van Swanenburgh and with Pieter Lastmann, and in 1631 removed to Amsterdam, where he established a high reputation as a portraitist and had as patrons and friends the foremost men of his day. In 1634 he contracted a fortunate and happy marriage with the comely Saskia Uylenborch, who figures on many of his canvases. He expended vast sums on works of art, and in his collection were antique sculptures and paintings by Raphael, Michelangelo and Giorgione. Rem-

brandt's wife died in 1642 and thereafter his fortunes began to decline; times were hard in Holland; the public taste failed to keep pace with the artist's developing genius, and his works went begging. He died in poverty and obscurity at the age of 63, having spent the last ten years of his life in continuous labors to pay his debts.

The mastery of *chiaroscuro,* or disposition of light and dark in a picture, is perhaps the greatest single achievement in the development of modern art; and in this Rembrandt has no equal, as he perhaps has no equal as an etcher. A notable example of his treatment of light is seen in his *Supper at Emmaus,* with its appalling suggestion of the supernatural; also in *The Syndics, The Lesson in Anatomy* and the so-called *Night Watch,* his three most famous portrait groups. Like most men of genius, Rembrandt was remarkably fertile and versatile. He painted numerous portraits, including many of himself, religious and classical subjects, and landscapes. His works are in the European galleries; and in America his canvases are to be seen in the galleries of the Art Institute, Chicago, and in the Metropolitan Museum, New York.

Rem'ington, Frederic (1861-1909), an American painter, illustrator and sculptor, born at Canton, N. Y. In the West, whither he went after completing art studies in New York, he studied carefully the life of the plain, with its Indians, cowboys and soldiers in action, and reproduced it with vigor and accuracy. His figures are lifelike and full of character, and his colors brilliant and daring. The same subjects he employed in meritorious statuettes and in his stories of Western life.

Rem'sen, Ira (1846-), a distinguished American chemist whose texts are widely used in schools and colleges. He is a graduate of Columbia College, and has since studied in German universities. Remsen was professor of chemistry in Johns Hopkins University from the time of its foundation in 1876, until 1901, when he became its president, continuing in the position until 1913, when he resigned to resume his former work in chemistry. He is one of the foremost American chemists, and is widely known for his original researches as well as for his exceptional work as a teacher.

Renaissance, *Ren" e sahns',* or **Revival of Learning,** literally a rebirth. In its fullest sense the term denotes that period of European history in which occurred the transition from medieval to modern methods of study and thought. No definite date can be assigned for its beginning or its termination. The supposition that the capture of Constantinople by the Turks in 1453, thereby sending into Europe such large numbers of Greek scholars and Greek manuscripts as at once to cause an intellectual revolution, is manifestly erroneous, since the nations of Europe must have been prepared for the reception of these influences or they could not have become effective.

CAUSES. The Renaissance includes much more than the revival of learning, and its causes reach much farther back than the capture of Constantinople.

One of the earliest influences is found in the Crusades, which occupied the attention of the Christian world from near the close of the 11th century into the second decade of the 13th century (See CRUSADES). The Crusades brought together the nations of Europe in a common cause, and one of the most important results was the intellectual broadening of the nations engaged. They also strengthened the central powers in both Church and State, so that in the century following the people were dominated by the ideas of a strong central Church and a strong central government in the State.

Along with the growth of these ideas, however, were developed those antagonistic to them, and in the early part of the 15th century the sway of both empire and Church began to wane. This gradual but steady loss of power was one of the important causes of the Renaissance.

Other important causes were the weakening of the feudal system, and certain inventions, particularly the mariner's

compass, paper and its application to the art of printing, and gunpowder. Moreover the substitution of the Copernican for the Ptolemaic system of astronomy revolutionized the theories concerning the earth and indirectly led to those explorations which in their influence transcended any other events of the 15th century. The influx of Greek scholars and the introduction of the classics was at an opportune time, and they wielded a great influence in the intellectual awakening of the period.

Contemporaneous with these causes and more far-reaching in its influence than any of them was the evolution of the systems of philosophy and education. During the Middle Ages education was restricted almost entirely to the clergy, who believed its chief service consisted in preparing them to analyze and discuss abstract themes. Religious and political creeds were accepted as they were handed down by the hierarchy in Church and State.

Realism, whose fundamental doctrine was that universal ideas had a more real existence than individual things, was the prevailing philosophy (See REALISM). Under these influences during the early part of the Middle Ages the individual was lost. Radically opposed to these ideas was the doctrine of nominalism, which was revived by William of Occam in the 14th century. Nominalism taught that the individual was all important and that universals were mere names without meaning. With the spread of nominalism came the introduction of Greek classics, and both exerted potent influences in enabling men to gain confidence in their own powers and in setting their spirits free from the thraldom of dogmatism that had prevailed for centuries.

RESULTS. The results of the Renaissance were commensurate with the magnitude of the movement. While these results are closely intermingled, they are most readily understood by discussing them separately. The most important changes were wrought along the lines of religion, government, education, literature and art.

RENAISSANCE

One of the earliest applications of the doctrine of individual freedom was that to the religious life. If the individual was free, it naturally followed that he was free to read and interpret the Scriptures for himself, assuming all responsibility for such interpretation. This thought was at the foundation of the fearless criticism hurled by Wiclif, Huss and others in England, and later leading to the Reformation, which in its turn was followed by the Counter-Reformation. See REFORMATION, THE.

The Renaissance was the beginning of the political freedom enjoyed today by the citizens of every civilized country. The rise of the individual was incompatible with absolutism in government. As we have seen, some preparation for these political changes of the 16th and 17th centuries preceded the Renaissance, notably the decline of feudalism and the granting of the Magna Charta, but the political evolution was more gradual than the religious, and it was not completed until long after the passing of the period responsible for its beginning. Now there is not a country of Europe whose government is not administered under a constitution.

Educationally the results consisted in broadening the intellectual vision, the introduction of the study of the mother tongue in place of Latin, the establishing of primary schools and the introduction of the various branches of natural science into the course of study. Moreover, with these changes came the introduction of those principles and methods of instruction which constitute the foundation of our present system of education.

In considering the relation of the Renaissance to literature, we must look first to Italy, where the new literary spirit was earliest manifest. The Italians were closer in language and blood to the ancient Romans than were the Northern nations, and their realization of their kinship with the great men of a glorious past exerted a tremendous influence in stimulating the imagination. Moreover, the political, intellectual and artistic at-

mosphere of cities like Florence tended to develop the individual as did the atmosphere of ancient Athens. Still another important agency was the presence in Italy of the ruins of Roman architecture, constant reminders of the ancient glory of Rome. It was Petrarch who first revealed what we call *humanism* as a vital element in the new literature. Humanism is chiefly a just recognition of the dignity of the individual, of his inherent worth and his right to self-esteem and to the enjoyment of life.

Petrarch not only emphasized the value of studying the Latin classics, but he collected Greek manuscripts and showed to his countrymen the importance of recovering a knowledge of Greek literature. In the classics, Petrarch and his disciples, particularly Boccaccio, found the material for developing the new spirit, and the impetus which he gave to humanistic studies is still felt in the field of learning. The search for and study of classical manuscripts later occupied the attention of such men as Cosimo and Lorenzo de' Medici, and of some of the popes, and in this movement are to be found the beginnings of many of the great Italian libraries.

In France, literary men responded quickly to the Renaissance influences, and Rabelais became the great representative of the movement. Both prose and poetry were enriched and strengthened by the new spirit. The Spanish representative of the movement is Cervantes, author of *Don Quixote*. The brilliant achievements of the Elizabethans mark the culmination of the literary revival in England.

The new feeling for classical antiquity awakened among the Italians was also manifest in their art, especially in painting. The Italian Renaissance produced many great painters, including Leonardo da Vinci, Raphael, Michelangelo and Titian. In Netherlands, Renaissance painting was also brilliantly developed by the Van Eycks, Memling, Van Leyden and others. In France, not only were painting and sculpture cultivated, but such minor arts as enameling, engraving, wood carving and pottery. Renaissance architecture was marked by the modification and blending of old styles so as to allow more space for wall decoration. St. Peter's at Rome and many other cathedrals and public buildings in Italy are examples of Renaissance architecture. See LITERATURE; PAINTING; ARCHITECTURE; SCULPTURE.

Renan', Ernest (1823-1892), French historian and essayist. He was born at Tréguier, Brittany, and educated for the priesthood at the Seminary of St. Sulpice, Paris. In 1845 he gave up all intention of entering the priesthood, and turned to literature. In 1860 Renan was appointed by Louis Napoleon a member of the commission to study the remains of Phœnician civilization. In 1862 he was chosen professor of Hebrew at the College of France, Paris, but on account of his religious views he was not fully established in this position until after the fall of the empire in 1870. Renan's works are numerous, but the book by which he is most widely known is his *Life of Jesus,* which has been translated into the languages of all civilized nations. He died in Paris.

Re'no, Nev., the largest city of the state and the county seat of Washoe Co., 31 m. n. of Carson City, on the Truckee River and on the Southern Pacific, the Nevada, California & Oregon, the Virginia & Truckee and other railroads. It is situated upon a plateau near the foot of the Sierra Nevada Mountains, nearly 5000 ft. above sea level, and has a greater rainfall than any other part of the state. Surrounding the city is a section engaged in mining, farming and stock raising, and Reno is a focus for its extensive commercial and industrial interests. Among the industrial establishments are railway shops and reduction works and manufactories of lumber, flour, packed meats, foundry and machine-shop products and plaster. The city is the seat of the University of Nevada, opened in 1886; and here are located the Nevada State Hospital for mental diseases and a United States Government Agricultural Experiment Station. The

first settlement on the site of Reno was made in 1859. The place was first called Lake's Crossing, but in 1868, when it became a railway station, the name was changed to Reno, in honor of Gen. Jesse Lee Reno, a Federal officer in the Civil War. It was incorporated in 1879 and first chartered as a city in 1899. It was rechartered in 1903. Population in 1920, 12,016.

Rensselaer, *Ren' se ler,* **N. Y.,** a city of Rensselaer Co., opposite Albany on the Hudson River, and on the New York Central & Hudson River and Boston & Albany railroads. It is connected with Albany by three bridges and was known as Greenbush until 1897, when it was chartered as a city and its name changed to Rensselaer. It is important chiefly as a railroad town, having car shops, roundhouses, freight yards, etc. It is situated in an agricultural region and its manufactures include felt, leather, chains, ice and lumber. In 1902 the village of Bath was annexed to Rensselaer. Population in 1910, 10,711. In 1920, 10,823.

Rent, the compensation paid for the services of land, houses or durable property of any kind. The owner of land or tenement draws up a contract with the one who wishes to use it, and a rate of rent is determined upon. This contract is known as the lease, and the contracting persons are, respectively, lessor and lessee, or landlord and tenant. Under agreement rent may be made payable in advance; it is due on the morning of the day determined upon for payment. The rate of rent, when it is an income from the use of land, depends on the quality of the land; that is, the fertility of the soil, its location, climate and accessibility have a marked effect on rent. Aside from generally accepted laws and regulations concerning rent, varying statutes in different states determine the proper relations between landlord and tenant. See LEASE.

Reprieve, *Re preve',* the suspension of a sentence for a crime, granted by the official who has power to pardon. This officer is usually the president of the United States or the governor of the state in which the crime was committed. The president acts only when the crime is against the United States. Reprieves are usually granted to allow further investigation in favor of the person convicted, but may be granted on other grounds, among which are insanity of the criminal and discovery of new evidence.

Reptil'ia, a division of cold-blooded Vertebrates distinguished by having a slow circulation and horny scales; the latter differ from those of fishes in being a hardened layer of skin generally united into one plate and rendered brown by means of a colored pigment in the inner layer; the outer layer of cells is clear and glassy. The skin of reptiles has no glands; hence all are dry-skinned animals and not slimy as is often supposed. There are four classes of Reptilia, excluding one class which consists only of fossil forms. These are: lizards, serpents, or snakes; turtles and tortoises; alligators and crocodiles. The Reptilia is a lower order than the birds but higher than the Batrachians and fishes.

Repub'lic. See GOVERNMENT, subhead *Republic.*

Repub'lican Party. See POLITICAL PARTIES IN THE UNITED STATES, subhead *Republican Party.*

Resaca, *Ra sah' kah,* **Battle of,** an engagement of the Civil War, one of the first battles of Sherman's campaign through Georgia, fought May 14 and 15, 1864, between 100,000 Federals under Sherman, and 55,000 Confederates under Johnston. While advancing toward Atlanta, Sherman had sent a detachment under McPherson to take Resaca and to cut off the Confederates' railroad supplies. Johnston, however, seized Resaca, which the Union troops had failed to capture, whereupon Sherman turned back, stationing himself to the north and west of Resaca. On the 14th there was heavy skirmishing, Johnston remaining in his intrenchments, which the Federals would not attack; late on the following day there was a desperate but indecisive battle north of the town between the Confederates under Hood and the Fed-

erals under Hooker. During the night a strong force of Federals crossed the Oostenaula River, and Johnston evacuated Resaca.

Resaca de la Palma, *Ra sah' kah da lah Pahl mah,* **Battle of,** an engagement of the Mexican War, fought May 9, 1846, between 5000 Mexicans, under General Arista, and 2000 Americans, under General Taylor. Following their retreat from Palo Alto, the Mexicans had intrenched themselves in a ravine, in Cameron County, Tex., where they had placed a battery which controlled the road passed by the Americans on their way to Ft. Brown. Captain May, of the Dragoons, won the victory by charging the Mexican guns. Arista escaped across the Rio Grande, leaving behind his private correspondence.

Reservoir, *Rez' er vwor,* a name which may be applied to any vessel for holding or storing a fluid, but which is generally used to describe an artificial basin to retain water until it is used, either in industrial enterprises or as part of a waterworks system for cities. Reservoirs are generally designed for storage, for settling or for distribution purposes. Considerable engineering skill is required in building these structures, as freezing, flooding and other influences must be taken into account. They are now constructed chiefly of concrete, with ample provision for overflowing and with walls of sufficient thickness to sustain the great pressure of the water. Impounding reservoirs are employed to dam up a stream and flood the district above it. Settling reservoirs are used to purify water by permitting the mud and other impurities to settle. Distributing reservoirs are sometimes used in cities to retain a water supply at different points. See WATERWORKS.

Resin, *Rez' in,* a name given to certain products of vegetable origin which exude from many plants. They differ from gums in being insoluble in water but soluble in alcohol. They exist in two forms: balsams, as they are called when dissolved in volatile oils; and gum resins, those mixed with gums. Resins differ greatly in action according to the plant from which they were produced, but they have the following characteristics in common: they never crystallize unless in the pure state; they melt and burn easily; and combine with alkalies to form a soaplike solution from which resin soaps are made. The resins are used chiefly in the manufacture of varnish and lacquers, and are obtained by making an incision in the trunk of resin-producing trees, from which the resin exudes. Trees of the Pine Family are the principal producers of resin. Asphalt and amber are fossil resins, the former of which is probably a fossil of petroleum.

Resist'ance, Elec'tric. See ELECTRIC RESISTANCE; OHM.

Resonance, *Rez' o nans,* the vibrating of a body in response to a periodic disturbance reaching it with the same frequency as it itself is capable of sending out. There are many illustrations of this familiar to all. If the dampers are raised from the strings of an open piano and some note on another instrument is sounded persistently for a few moments, it will be found that one or more of the strings have been set into vibration by the sound waves reaching them; these strings are those which, if struck, would emit sound waves of the same pitch as that of the sound which excited them into vibrating. Again, the receiving apparatus of a wireless-telegraph station must be "tuned" or adjusted to have the same natural period of vibration or electrical oscillation as that of the electrical-oscillating system of the sending station, so that it can resonate and absorb the energy of the electromagnetic waves which strike it at the "tuned" frequency. Still again, if a crowd of men marching over a bridge so time their steps that the period of time between two successive steps is the same as the natural period of vibration of the bridge structure, each step will serve to put the bridge into more and more violent vibration, and serious damage may result. This is a simple case of mechanical resonance.

Res"pira'tion, the act or process of breathing or taking air into the lungs

through the air passages. It involves the alternate expansion and contraction of the chest by means of the scaleni and intercostal muscles attached to the cervical vertebræ; but in a broader sense it may be said to involve the functions not only of its principal organs, the lungs and air passages, but the blood vessels of the pulmonary circulation and the muscles, cartilages and bones which supplement their activity. The act of expanding the chest, or of taking air into the lungs, is concerned with inspiration; that of contracting, or expelling the air from the lungs, with expiration. With each expansion of the chest the ribs are thrown outward, the chest bone is thrust forward and the diaphragm, or floor of the chest, which curves upward when at rest, is flattened, pushing the abdomen outward.

The function of respiration is to purify the blood with the oxygen taken from the air breathed in and to carry to the outer air the poisonous carbon dioxide, which the blood has collected in its circulation through the system. This transfer is made in the air sacs of the lungs, which the air reaches through the windpipe and its branches. During quiet breathing about one pint of air is taken into the lungs with each inspiration. This is called tidal air. The amount of air which remains after the ordinary expiration and which can be expelled from the lungs by force is called supplemental air. That part of the air which remains in the lungs and which cannot be expelled even with the most violent effort is called residual air. The amount of air which we are capable of taking, over and above what is inspired in quiet breathing, is called complemental air. The total amount of air which can be expelled from the lungs after a deep inspiration is called the vital capacity.

Air is not pulled into the lungs, as has sometimes been supposed. All around us is a sea of air pressing upon us with a weight of about 15 lb. to the square inch. As this pressure is neutralized by being the same on all sides, we fail to feel its weight. Now, when the muscles of the chest enlarge that cavity, they create a vacuum and the pressure without forces the air into it. The rebound of the muscles and elastic tissues closes the air cells and presses the air out as from a bellows. This occurs each time a volume of air enters and leaves the lungs. Pure air contains about 21 parts of oxygen. The average persons inspires in 24 hours 648,000 cubic inches of air, or 28.7 lb. In a year he takes from the air 657 lb. of oxygen and gives off 730 lb. of carbon dioxide. As oxygen serves to renew the blood and through it feed the whole body, the importance of pure air for maintaining a healthy condition can readily be seen. The purest air is out of doors, and as much time should be spent in the open air as possible. In closed rooms the air becomes vitiated by the impurities thrown off by the occupants and should be purified by proper ventilation. See LUNGS; CIRCULATION; HEART; TRACHEA; BRONCHIAL TUBES.

Restigouche, *Res" ti goosh',* a river of New Brunswick. It rises in the northwestern part of the province, flows northeastward and eastward and enters Chaleurs Bay through a broad estuary. It is about 200 m. long and is navigable to Campbellton.

Resump'tion. See SPECIE PAYMENTS, RESUMPTION OF.

Resurrection, *Rez" u rek' shun,* the restoration of those who have died, to the full possession of their powers and faculties. A belief in the resurrection of the dead has appeared in various religious systems, but was probably never universally accepted by the Hebrews, the Sadducees being among the strongest opponents of the doctrine. The idea of the resurrection is stated several times, however, in the New Testament. More fundamentally a part of Christian theology is the belief in the Resurrection of Christ, which may be described as the corner stone of Christian faith. Several circumstances point to the authenticity of this event: the variety of circumstances under which Christ appeared; the many evidences of truthfulness and sincerity in the testimony given by the various witnesses; the promptness with which the

news spread and its acceptance by those who were not present. The various explanations which have been devised to refute the truth of Christ's Resurrection have never been adequate to shake the faith of the Christian Church in this fulfillment of a divine mission.

Resurrection Plant. See ROSE OF JERICHO.

Retainer, *Re ta' ner,* in law, the engagement by a client of an attorney or counselor at law to take charge of his side of a suit in court or to act for him in a professional capacity in any other matter. A verbal agreement is sufficient, and when once engaged the attorney has full power to act in his professional capacity. The retainer is usually accompanied by a fee, also called a retainer, which is part payment for the services to be rendered.

Rev"ela'tion, Book of, the last book of the New Testament, also called the Apocalypse. Its authorship is generally ascribed to St. John, but many authorities have attempted to refute this. The date most commonly accepted is 95 A. D., when John was in exile on the Island of Patmos. The purpose of the book was, apparently, to explain the dominion of evil in the world and to encourage the believers in their faith by foretelling the approaching end of evil. It contains an abundance of imagery and numerous visions, including that of the last judgment, the new heaven, the new earth and the new Jerusalem. *Revelation* has had many interpretations, but scholars generally agree in looking for the meaning of the book in the conditions of the author's own times.

Rev'elstoke, a city of Canada in the Province of British Columbia, on the Columbia River and on the Canadian Pacific Railway, 379 m. n.w. of Vancouver. The city is the source of supplies for the mining districts of Columbia and Kootenay, and a tourist center for fishing and hunting big game. The neighborhood supplies minerals, lumber, pulp wood, brick clay, and water and electric power. There are both city and mountain parks. Among the important buildings are hospitals, hotels and churches. The leading industries include railway repair shops, sash and door factories and breweries. Population in 1911, 3017.

Rever'beratory Furnace, a furnace of the flame class, in which the flame chamber is arched in order that the flame or heat may be reflected and concentrated downward on the materials to be heated, which are placed on the lower part, called the hearth. This furnace is used chiefly in working metals, particularly in the making of steel. A modified form of this furnace, which is used exclusively for making malleable iron, employs a strong air blast forced downward on the hearth through tuyeres in the arch. This is known to the trade as an air furnace and is used to convert pig iron (gray iron) into malleable iron (white iron), which possesses many of the qualities of steel, especially in regard to toughness and hardness. See IRON AND STEEL.

Revere, *Re veer',* **Mass.,** a town and summer resort of Suffolk Co., 4 m. n.e. of Boston, on the Boston & Maine Railroad. The town also includes a number of villages and is an attractive residential place and summer resort. It is situated on Massachusetts Bay and Revere Beach and is one of the most popular bathing resorts on the Massachusetts coast, having a bathhouse built and maintained by the state. The place was settled in 1626 and named Rumney Marsh. In 1739 it was incorporated as Chelsea. The name was changed to Revere in 1871 in honor of Paul Revere. There are a number of churches and good schools. Population in 1910, 18,219. In 1920, 28,823.

Revere, Paul (1735-1818), an American patriot, born at Boston, Mass. He had a meager schooling, was an engraver by trade, and in 1756 was second lieutenant in the expedition against Crown Point. He was a leader in the Boston Tea Party and a member of the society that watched the British in Boston. He refused to act on the Boston grand jury, 1774, because the judges were not dependent upon the Legislature for their salaries. On the night of Apr. 18-19, 1775, he rode from Boston to Lexington

to warn John Hancock and Samuel Adams of the approach of the British. He was captured while on his way to Concord, but was immediately released. The same year Revere engraved the plates and printed the paper money for the provincial Congress and established a powder mill at Canton. In April, 1776, he became a major of infantry in the Massachusetts militia; in November, lieutenant-colonel of artillery; and, finally, commandant of the fort, Castle William. Revere was practically unknown until Longfellow used his exploit for his poem, *Paul Revere's Ride.* The popularity of the poem at once made Revere a national hero, a position which he has since held in the hearts of the boys and girls of the entire country.

Rev"olu'tionary War in America, the conflict through which the thirteen English colonies in America became free and independent. The numerous causes of the war were economic, political and hostile acts, some of the grievances dating back to 1651. All were the outcome of the commercial policy of Great Britain towards her colonies. This policy took expression in restrictions upon commerce (See NAVIGATION ACTS), in taxation without representation and in the establishment of a standing army of British regulars in America. Articles upon the various battles, principal statesmen and soldiers of the period appear under their proper titles.

The direct history of the Revolution began in 1761, when James Otis resisted the general search warrants. A subsequent period of constitutional agitation included the Boston Massacre, March 5, 1770 (See BOSTON MASSACRE), the destruction of the *Gaspee,* June 17, 1772 (See GASPEE, AFFAIR OF THE), and the Boston Tea Party, Dec. 16, 1773 (See BOSTON TEA PARTY).

EARLY MOVEMENTS. The first great movement of the war was the campaign around Boston, 1775-1776. It was fought to redress wrongs, not to secure freedom from England. The opening military event was the American victory of Lexington and Concord, Apr. 19, 1775, and the immediate beginning of the siege of Boston. On May 10 a colonial force from the Green Mountains and the Connecticut Valley, under Ethan Allen, and regulars under Benedict Arnold, captured Ft. Ticonderoga. A little later they took Crown Point. But the first important battle of the war occurred at Bunker Hill (See BUNKER HILL, BATTLE OF), June 17. Their victory here enabled the British to retain a hold on Boston.

It was feared that Sir Guy Carleton, who was governor of Canada, was planning to attack Ticonderoga; so the Americans undertook to forestall him by invading Canada in the fall of 1775. This was one of the most brilliant expeditions of the war. One detachment of 2000 under Montgomery descended Lake Champlain, captured St. John's after a siege of 50 days and, later, Nov. 12, took Montreal. In the meanwhile Benedict Arnold and Daniel Morgan, with another force of 1200, marched through the woods of Maine to aid Montgomery in capturing Quebec. The city was stormed, the final assault occurring Dec. 31 and proving a failure. Montgomery was killed, Arnold was wounded and Morgan was captured. As a result the Americans were driven back to Crown Point. March 17, 1776, Boston fell into the hands of the colonial forces, the English sailing to Halifax, which they subsequently left for the vicinity of New York City.

In the meanwhile, January, 1776, Clinton with 2000 men had left Boston for the coast of North Carolina. Promised aid from a fleet from Ireland and from 1600 Tories failed him, and his scheme for the complete subjugation of the Southern colonies proved disastrous when an attack upon Charleston, S. C., ended in the American victory of Ft. Moultrie, June 28. July 4 the Declaration of Independence was adopted (See DECLARATION OF INDEPENDENCE).

NEW YORK AND NEW JERSEY. The second great movement of the war was the campaign around New York and across New Jersey, 1776-1777. The conflict was now being waged as by two for-

REVOLUTIONARY WAR

eign nations. England hoped to annihilate the commercial and military center of the United States, and, as a result, the attitude of the Americans was mainly defensive. Operations began with the Battle of Long Island, Aug. 27, 1776, and with the capture of New York City by Howe, Sept. 15. In November, forts Washington and Lee fell to the British, and General Washington was obliged to retreat through New Jersey, hard pressed by Howe, who hoped to take Philadelphia. Frederick the Great called this retreat, which gave play to Washington's military genius, one of the most brilliant campaigns in history. It culminated in the victory of Trenton, Dec. 26, 1776, when Washington surprised a detachment of Hessians in a Christmas night carousal, capturing them all, and in the successful battle at Princeton, Jan. 3, 1777. This last encounter compelled the British to return to the vicinity of New York. Previous victories had been local; this was continental, and it firmly established the cause of American freedom.

Burgoyne's Campaign. The third great action of the struggle was Burgoyne's campaign for conquering New York, 1777. With some 8000 men he was to advance from Canada by way of Lake Champlain upon Ticonderoga. Having captured it, he was to go down the Hudson to Albany. At the same time Howe, with an approximately equal force, was to ascend the Hudson, capture the forts in the Highlands and march on to Albany. Saint Leger, in the meanwhile, was to clinch the aid of the Six Nations and of the Tories. He had orders to go up the St. Lawrence to Oswego, later crossing New York along the Mohawk Valley and finally joining Burgoyne. Burgoyne's campaign began with the capture of Ticonderoga, July 5, 1777. He lost one-seventh of his men at Bennington, Aug. 16, and as Howe failed to join him, he was seriously defeated on Sept. 19 and again on Oct. 7 at Bemis Heights, near Saratoga. This catastrophe forced his surrender, and he finally capitulated on Oct. 17. The Battle of Bemis Heights, or Saratoga, was the turning point of the war. See Saratoga, Battles of.

Movements in Pennsylvania. Previously, in April, 1777, Lafayette had left Spain for America in a vessel which he had fitted out at his own expense. With him he brought Baron de Kalb. The Poles, Kosciusko and Pulaski, had arrived some time before, and Baron von Steuben came the following December. These men rendered inestimable service to the American cause, and all were given commissions in the army.

Howe planned to have captured Philadelphia before it should be necessary to aid Burgoyne and Saint Leger at Albany. Consequently, on June 12, he had set out across New Jersey with 18,000 men, having left 7000, under Clinton, to guard New York City. His victory at Brandywine Creek, Sept. 11, enabled him to take Philadelphia two weeks later. Part of his army was at headquarters in Germantown. Here the Americans attempted an attack; but the result was disastrous to them, principally owing to a dense fog. They then retreated to winter quarters at Valley Forge (See Valley Forge). This ended the campaign of 1777 and 1778.

Monmouth and Newport. The American cause was strengthened by the French Treaty of Alliance, which was signed at Versailles, Feb. 6, 1778. A short time after Count d' Estaing approached Sandy Hook with a powerful French fleet and force. Fearing for his position, therefore, Clinton, who had superseded Howe, left Philadelphia, hard pressed by Washington, who overtook him at Monmouth Courthouse, June 28. After a disastrous battle here, the British retired to New York City; the Americans, to White Plains. Among other events of this time was the siege of Newport, R. I. The town had been captured by the British in 1776. With French aid, the Americans hoped to regain it and began to besiege it, July 29, 1778. But Howe's fleet arrived at the crisis of affairs, and the French had to withdraw to engage it. A storm scattered both fleets.

The British kept possession of the city. Stony Point was stormed May 31 and July 16, 1779. This was one of the most brilliant attacks in the history of the war; but a partial gloom was cast over it by the treason of Benedict Arnold, July-September of the following year. See Arnold, Benedict.

Campaigns in the South. The fifth important movement of the contest was the campaigns in the South, 1779-1780. Chief among the actions were the routing of the Americans at Brier Creek, March 3, 1779; the siege of Charleston, which resulted in its surrender to the British, May 12, 1780; and the crushing defeat of the Americans at Camden, Aug. 16. Besides, there were the American victories at King's Mountain, Oct. 7, and at the Cowpens, Jan. 17, 1781, by which almost all of the light-armed men of Cornwallis were taken from him. At Guilford Courthouse, March 15, the British were victorious, but at such heavy costs that they had to abandon the interior of North Carolina. At Eutaw Springs, Sept. 8, both sides claimed a victory. In the beginning of this campaign the American commander, Gates, indulged in a succession of blunders, which brought only defeat to his army; when, however, he was superseded by Nathanael Greene, the campaign turned into one of the three most brilliant movements of the war, and the English, under Cornwallis, were finally driven into Virginia. The Yorktown campaign, 1781, was the sixth and last of the war. Washington left White Plains with 2000 Americans and 4000 French and marched 400 m. to the vicinity of Yorktown. He there met Lafayette, Sept. 18, and, aided by a French fleet and army, he forced Cornwallis to surrender his 8100 men, Oct. 19, 1781.

The Frontier. The war of the frontier began with the raid and massacre of Wyoming Valley (See Wyoming Valley Massacre), July 3 and 4, 1778. That at Cherry Valley occurred in November. At the Battle of Newtown (Elmira), N. Y., Aug. 29, 1779, a detachment under General Sullivan completely crushed a force of British and Indians. In the meanwhile, George Rogers Clark in 1779 had established the authority of the colonies in the Northwest Territory by capturing Kaskaskia, Cahokia and Vincennes.

Naval Engagements. The one important naval engagement of the war was the battle between the *Bon Homme Richard* (See Bon Homme Richard), the flagship of John Paul Jones, and the *Serapis,* Sept. 23, 1779. This brilliant American victory was one of the most famous sea battles of modern history.

Treaty. For some time after the surrender of Cornwallis, the British sovereign and ministry refused to admit defeat or to consider terms of peace. But negotiations by Franklin, Jay and John Adams were carried on until a treaty was finally signed at Paris, Sept. 3, 1783. This treaty recognized the independence of the United States, to which it confirmed the land between the Allegheny Mountains and the Mississippi River, from the Great Lakes and St. Lawrence River south to the northern border of Florida. Chief among its other provisions were those for the British evacuation of Western posts, for the maintenance of American fishery rights at Newfoundland and for the payment of war indemnity to the Loyalists. Consult Lecky's *The American Revolution.*

Revolv'er, a small firearm carrying several shots in a revolving chamber or barrel; a kind of pistol. The revolver developed from the two- or more-barreled pistol, in which it was found advantageous to revolve the barrels so that each one might come, in succession, under the same hammer. Revolvers were in use as early as the beginning of the 17th century. The single-barreled pistol with a revolving chamber, presenting charges in succession at the breech of the barrel upon raising the hammer, originated about the same time as the pistol with revolving barrels. Many improvements were introduced from time to time until Samuel Colt of Hartford, Conn., invented the Colt revolver, now of world-wide fame, and probably the best made.

Reynolds, *Ren' ulz,* **Sir Joshua** (1723-1792), the most celebrated of English portrait painters, born at Plympton, Devonshire. After brief studies in art he began painting portraits, subsequently spending three years in Rome. Returning to England he became president of the Royal Academy and was knighted. It is estimated that he painted from 2000 to 3000 portraits, which form an epitome of English society in his day. They are realistic in treatment and admirable in color. His women are gentle and beautiful, though somewhat superficial, his men strongly active and individual; his art has many classic refinements; his composition and brushwork were scholarly, but his drawing was often weak. Those of his portraits that are particularly worthy of praise are *The Duchess of Devonshire, Nelly O'Brien* and *Mrs. Siddons as the Tragic Muse.*

Rhea, *Re' a,* a bird of the Ostrich Family, differing from the African ostrich by having three toes instead of two and by the absence of the tail plumes. The rhea stands about 57 inches high. The feathers are grayish, with black on the neck and breast. The legs are whitish. Like the ostrich, the wings are rudimentary and are covered with long, soft feathers. These ostriches live on the plains of South America, where they are usually seen singly or in small companies. They run with great swiftness. The breeding habits are like those of the African ostriches, several females laying eggs to the number of from 30 to 80, or even 120, which are gathered by the male, placed in a depression in the sand and cared for. The males care for the young for a short time.

Rheims, *Reemz,* a city of France situated on the Vesle, 107 m. n.e. of Paris. The city occupies a beautiful site at the foot of vine-clad hills and is partially surrounded by detached forts. It was one of the walled towns of the Middle Ages, and a few of the most interesting gates still remain, though most of the walls have been replaced by boulevards. The Cathedral, built in the 13th century, is one of the finest specimens of Gothic architecture in the world. Its west façade has 500 statues and that on the north is nearly as attractive. The French kings were crowned here from Philip Augustus to Charles X. The city has a library of over 80,000 volumes and numerous buildings of historic interest. It was occupied by the Germans in 1870. It is an important center of woolen manufactures and is also noted for its production of champagne. Population in 1911, 115,178.

Rhetoric, *Ret' o rik,* in its broadest sense, the science and art of communication in language. The term is frequently made to include everything relating to the art of composition, also poetics and literary and stylistic criticism. Considered from a scientific point of view, rhetoric is related to the branch of knowledge concerned with the relations of men in society. The formal problems of rhetoric, in a restricted sense, are concerned with the nature, origin and function of discourse, its structure (words, phrases, sentences, whole compositions and its typical modes—description, narration, exposition, argument and persuasion) and the means of distribution (books, conversation, magazines, newspapers, etc.).

Rhine, *Rine,* a river of Germany, the principal river of western Europe. It is formed by the confluence of the Vorderrhein and the Hinterrhein, two head streams rising in eastern Switzerland. Flowing through Lake of Constance, the Rhine, continuing westward, becomes swift and narrow and makes frequent plunges over rapids and falls, and from the Falls of Schaffhausen to Basel marks the boundary line between Germany and Switzerland. Turning north, it flows between the Black Forest and the Vosges Mountains, enters upon the most romantic and beautiful part of its course—from Bingen to Bonn—winds westward into Holland, divides into several branches and empties into the North Sea. Important tributaries are the Neckar, the Main, the Moselle and the Ruhr. Among the towns on its banks are Constance, Basel, Strassburg, Mannheim, Worms, Mainz,

Bingen, Coblenz, Bonn, Cologne, Düsseldorf, Arnhem, Utrecht and Leyden.

At intervals along its course through Rhenish Prussia, are famous ruins of castles, romantic scenery, hillsides covered with extensive vineyards and mountains decked with ancient forests. The adjoining valleys are densely populated and it is estimated that the river is visited annually by over 1,000,000 tourists. It is navigable from Basel throughout the rest of its course and has become one of the most important commercial waterways of Europe. Timber, coal, iron, agricultural and other products are shipped in large quantities, the annual bulk exceeding 8,000,000 tons. The steamers have interfered with the increase of salmon fisheries, but other varieties of fish abound.

Rhine Province, or **Rhenish Prussia,** a province of Prussia, bounded on the n. by Netherlands, on the e. by Westphalia and Hesse-Nassau, on the s. by Lorraine and on the w. by Luxemburg, Belgium and Netherlands. The total area is 10,423 sq. m., of which less than one-half is under tillage. Wheat, barley, rye, oats and potatoes represent the principal agricultural products, and the vineyards along the Moselle and the Rhine yield abundant supplies of wine that are generously exported. Among the mineral resources are coal, lead, copper, iron, zinc, manganese and quicksilver; the manufactories include machine shops, ironworks, breweries, distilleries, textile factories, glassworks and paper mills. The silks of Krefeld and the woolens of Aix-la-Chapelle are among the most famous in the world. The province is divided into the five districts of Cologne, Düsseldorf, Aix-la-Chapelle, Coblenz and Trèves. Coblenz, the city, is the capital, but the principal town is Cologne. Population in 1910, 7,121,140.

Rhinoceros, *Ri nos' er os,* a huge tropical animal representing in five species the only survival of a once widely distributed family of Mammals. The present-known species are natives of Africa and India, where they are hunted for their flesh, horns and skin.

The rhinoceros is a hideous animal with heavy body, covered by tough, blue-black, hairless hide; it has a large head, with erect, stalked ears and broad nose, upon which, in the African, are two fierce-looking horns, and in the Indian, only one. The limbs are large and strong and are terminated by round feet, bearing short toes and a thick sole pad. The skin of the Indian species is wrinkled and folded into platelike folds which resemble a suit of armor.

The horns of the rhinoceros differ from those of most horned animals in being made up of a number of closely bound fibers; they are used by the Chinese in the preparation of medicine. The rhinoceros has keen hearing and scent but poor eyesight, a fact which is no doubt the cause of its frantic, blind charges when approached by a human enemy. On account of its size it has few if any other enemies than man. The white, or square-mouthed, rhinoceros is less common than any other species, and its peculiarities and habits are less well known. All members of the family are nocturnal, enjoy cool, shady pools or half-dried mud holes, and feed upon grass, grains, shrubs and tender trees. Upon their backs are generally perched their friends, the tick birds, which feed upon the vermin in the animals' hides and by nervous flight give warning of the approach of danger.

Rhizopoda, *Ri zop' o da,* one of the subdivisions of the group of one-celled animals known as Protozoans. The Rhizopoda are all microscopic, aquatic animals, found abundantly in stagnant water but also common in all lakes and streams or seas. Many are separate individuals, as the amœba, but frequently they form large colonies of associated organisms. They are the lowest group of animal life and are without any specialization or organs. See AMŒBA; PROTOZOA; ZOOLOGY, subhead *Classification.*

Rhode Island, *Rode" I' land,* LITTLE RHODY, one of the New England States, is bounded on the n. and e. by Massachusetts, on the s. by the Atlantic Ocean and on the w. by Connecticut.

RHODE ISLAND

SIZE. The extreme length of the state from north to south is 48 m., the extreme width is 36 m. The area is 1248 sq. m., of which 181 sq. m. are water. Rhode Island is the smallest state in the Union and is smaller than many counties in the larger states. If Texas were divided into counties, each the size of Rhode Island, there would be 212 counties in the state with 1320 sq. m. left over.

POPULATION. In 1920 the population was 604, 397. From 1910 to 1920 there was a gain in population of 61,787, or 11.4 per cent. Rhode Island is the most densely populated state in the Union, there being 566.4 inhabitants to the square mile, and the state's rank in population is 38.

SURFACE. The surface of the state is generally hilly, but the highest point, in Providence County, has an altitude of only 805 ft. The eastern portion is broken by a large inlet known as Narragansett Bay, which extends northward for 28 m. This body of water has numerous arms and contains several islands. On one of these is situated Newport, the famous summer resort.

RIVERS. Rhode Island has no large rivers, but her streams are useful in furnishing water power for the great manufacturing establishments. The principal rivers are the Blackstone and Pawtuxet in the north and the Pawcatuck in the south. Providence River, which is an estuary of wide expanse, has three tributaries, the Woonasquatucket, the Moshassuck and the Seekonk. All of the streams have rapid currents.

CLIMATE. The climate of Rhode Island is somewhat milder than that of the greater part of New England. The mean temperature for January is 36°; for July, 76°. In the northern part of the state the rainfall averages 40 inches, and on the coast it is about 50 inches.

MINERALS AND MINING. The chief mineral resources are granite, iron ore and limestone. Coal is mined on the Island of Rhode Island and in Cranston, near Providence, and several excellent granite quarries supply stone suitable for building purposes and for monuments.

AGRICULTURE. The most fertile sections are in the northeastern portion and the Island of Rhode Island in Narragansett Bay. Hay and forage are the most important crops. Fruit raising, poultry and market gardening receive much attention. Cranston has two of the largest market gardens in the country.

FISHERIES. The proximity of Rhode Island to the sea makes fishing an important industry. About 1700 persons are engaged in this industry and the value of the products amounts to nearly $1,000,000 annually. Menhaden, clams, oysters, scallops and lobsters are the chief sea products.

MANUFACTURES. Rhode Island is a leading manufacturing state. Abundance of water power and numerous good harbors have greatly aided the state in maintaining her position as one of the first in the production of cotton and woolen goods, worsteds, tools, boots, shoes, jewelry and silverware. The cotton-spinning industry had its birth on this side of the Atlantic in Rhode Island, for Samuel Slater, who had copied the Arkwright models, was producing machine-made cotton yarn in Pawtucket as early as 1790. The dyeing and finishing of textiles and the manufacture of silk and silk goods, electrical apparatus, locomotives, engines, screws and tools are also important. The gimlet-pointed screw was invented in Rhode Island. Nearly 100,000 persons are engaged in the state's manufacturing establishments.

TRANSPORTATION AND COMMERCE. The important railroad lines within the limits of the state are controlled by the New York, New Haven & Hartford Railroad. The state is supplied with an extensive system of electric lines. Providence and other towns on Narragansett Bay are connected with Southern Atlantic coast ports by steamship lines. Steamship lines also connect Providence with points in Southern Europe.

Domestic commerce is more important than foreign. The chief imports are coal, lumber, cotton and other raw material, and the exports are manufactured goods.

RHODE ISLAND

GOVERNMENT. The chief executive officers are elected for two years. The Legislature, or General Assembly, consists of a Senate and House of Representatives. Each city or town sends one senator, and every town, regardless of size, at least one representative. The number of representatives is limited to 100 and no town or city can be represented by more than one-fourth of this membership. The lieutenant-governor presides over the Senate.

The judicial department consists of the Supreme Court and inferior courts established from time to time by the Gen. Assembly. Supreme Court justices are elected by the General Assembly in grand committee and hold office until the Assembly by resolution declares the office vacant.

EDUCATION. The public school system is under the supervision of a commissioner of public schools. Education is compulsory and the schools are excellent. High schools are maintained in all municipalities and free secondary school education is provided in all towns. The most important educational institutions are the Rhode Island Normal School at Providence, the Rhode Island State College, Rhode Island School of Design, and Brown University (See BROWN UNIVERSITY).

STATE INSTITUTIONS. The state penal and reformatory institutions are situated on what is known as the "State Farm." This is a tract of land containing about 740 acres, in Cranston, near Providence. These institutions consist of a workhouse and house of correction, a hospital for the insane, an almshouse, the state prison and the Providence County Jail, the Sockanosset School for Boys and the Oaklawn School for Girls.

CITIES. The principal cities are Providence, the capital; Pawtucket, Woonsocket, Newport, Central Falls and Cranston.

HISTORY. Rhode Island was named to commemorate the defense of the Isle of Rhodes by the Knights of St. John. It was first settled at Providence, June, 1636, by the exile from Massachusetts Bay, Roger Williams. Anne Hutchinson settled at Portsmouth in 1638. Newport was established in 1639; Warwick, in 1642. All were united under a liberal charter in 1644, and, under one still more liberal, received in 1663 from Charles II, Rhode Island was governed for over a century and a half. The first census, 1708, showed 7181 persons. In 1762 the first American synagogue was built at Newport. Rhode Island was the last to adopt the Constitution, May 29, 1790, clinging to its royal charter, which was authority until 1843. Dorr's Rebellion occurred in 1841 (See DORR, THOMAS WILSON). For the Union army of the Civil War, Rhode Island furnished over 23,000 men.

GOVERNORS. Arthur Fenner, 1790-1805; Paul Mumford, 1805; Henry Smith, 1805-1806; Isaac Wilbour, 1806-1807; James Fenner, 1807-1811; William Jones, 1811-1817; Nehemiah R. Knight, 1817-1821; William C. Gibbs, 1821-1824; James Fenner, 1824-1831; Lemuel H. Arnold, 1831-1833; John B. Francis, 1833-1838; William Sprague, 1838-1839; Samuel W. King, 1839-1843; James Fenner, 1843-1845; Charles Jackson, 1845-1846; Byron Diman, 1846-1847; Elisha Harris, 1847-1849; Henry B. Anthony, 1849-1851; Philip Allen, 1851-1853; Francis M. Dimond, 1853-1854; William W. Hoppin, 1854-1857; Elisha Dyer, 1857-1859; Thomas G. Turner, 1859-1860; William Sprague, 1860-1863; William C. Cozzens, 1863; James Y. Smith, 1863-1866; Ambrose E. Burnside, 1866-1869; Seth Padelford, 1869-1873; Henry Howard, 1873-1875; Henry Lippitt, 1875-1877; Charles C. Van Zandt, 1877-1880; Alfred H. Littlefield, 1880-1883; Augustus O. Bourn, 1883-1885; George P. Wetmore, 1885-1887; John W. Davis, 1887-1888; Royal C. Taft, 1888-1889; Herbert W. Ladd, 1889-1890; John W. Davis, 1890-1891; Herbert W. Ladd, 1891-1892; D. Russell Brown, 1892-1895; Charles W. Lippitt, 1895-1897; Elisha Dyer, 1897-1900; William Gregory, 1900-1901; Charles Dean Kimball, 1901-1903; L. F. C. Garvin, 1903-1905; George H. Utter, 1905-

1907; James H. Higgins, 1907-1909; Aram J. Pothier, 1909-1915; R. L. Beeckman, 1915-1921; E. J. San Souci, 1921—.

Rhodes, *Rodze,* an island in the Mediterranean Sea, the possession of Asiatic Turkey. It is 12 m. distant from the southwest coast of Asia Minor. It is 49 m. long and has an area of 564 sq. m. Between the mountain regions are fertile valleys yielding supplies of oranges, citrons and oils, which, however, can no longer vie with the ancient prosperity of Rhodes. It was early inhabited by the Dorians. The city of Rhodes is the capital, and the island is now governed by a Turkish pasha. Population, estimated at 73,000.

Rhodes, Cecil John (1853-1902), an English statesman, born at Bishop Stortford, England. Lack of health took him to Africa before his education was completed. He went to the Kimberley diamond fields, where he became very wealthy, and returned to England when he was 23 years of age, continuing his education and ultimately graduating from Oriel College, Oxford. In 1880 he became a member of the Cape Colony Parliament. It was his hope to bring about a union of South Africa under British rule, and to accomplish this without recourse to arms; but the annexation in 1884 of Bechuanaland brought on war with the Boers. Rhodes succeeded in getting the King of Matabeleland to cede a tract of country to the British Government. This tract was called Rhodesia and was placed under control of the British South African Company with Rhodes as chief. Rhodes became premier of Cape Colony in 1890 and sought to keep peace with the Boers, but lost influence on account of the Jameson Raid and resigned. He was the prime mover in the Cape-to-Cairo telegraph and railway projects. A large part of his fortune was left to endow scholarships in Oxford for South African and other students. See RHODES SCHOLARSHIPS.

Rhodes, James Ford (1848-), an American historian, born in Cleveland, Ohio, and educated at the universities of New York and Chicago. He served as Paris correspondent of the Chicago *Times* in 1867-68, traveled in Europe for the purpose of making industrial investigations, and, after retiring from business in 1885, began the work which places him among the foremost American historians of the present day—*History of the United States from the Compromise of 1850.* This work, completed in seven volumes in 1906, is scholarly and impartial, and gives the most complete account of the Civil War in existence. Mr. Rhodes is a member of various historical associations, the recipient of many honorary degrees, and in 1901 was awarded the Loubet prize by the Berlin Academy of Sciences, for his researches.

Rhodesia, *Ro de' zhi a,* a British protectorate of central Africa lying wholly inland and divided by the Zambesi River into Northern Rhodesia and Southern Rhodesia. Southern Rhodesia is sometimes known as British South Africa and comprises the territories formerly known as Mashonaland and Matabeleland. The capital is Salisbury, where the commissioner and the members of the executive and legislative council have their official residence. Cereals, vegetables, tobacco, rubber and cotton are produced, and silver, lead, copper, gold, chrome, asbestos, diamonds and coal are mined.

Northern Rhodesia was once divided into North-Eastern and North-Western Rhodesia, but in 1911 was constituted a single state. The chief city is Livingstone in the northeastern part. Both Northern and Southern Rhodesia are under the administration of the British South Africa Company. Many railways extend across Rhodesia, which is also in the line of the Cape-to-Cairo Railway. The population is about 1,725,000.

Rhodes Scholarships, scholarships established in perpetuity by Cecil Rhodes for the support at Oxford University, for a term of three years each, of about 175 students. These scholarships are awarded by the trustees of a fund provided by the will of Cecil Rhodes. Fifteen are assigned to candidates recom-

mended by the Emperor of Germany; two, for representatives from each of the states of the United States; the others go to the representatives of various colonies of the British Empire. Rhodes sought to encourage a better acquaintance and closer union among the English-speaking peoples of the world. He included Germany, because the "Emperor had made instruction in English compulsory in German schools."

The scholarships amount to $1500 a year each and continue to the same student for three years. In the United States the students are selected by a committee in each state. The chairmen of the committees are usually presidents of state universities or of the leading university in states having no state university. Applicants must be between 19 and 25 years of age and citizens of the state from which they are appointed. They must pass an examination in Latin, Greek and mathematics. In making the appointments proficiency in literary attainments and scholarship counts three-tenths, success in outdoor sports two-tenths, qualities of manhood three-tenths and qualities of leadership two-tenths. The first and fourth attainments are determined by the faculty of the school in which the applicants prepare, and the second and third are determined by vote of the fellow students. Only one-half of these appointments can be filled each year. See RHODES, CECIL JOHN.

Rhododendron, *Ro" do den' dron,* or **Rose-Bay,** a very ornamental genus of plants of the Heath Family, whose species include trees, shrubs and air plants. The most common American varieties are shrubs or small trees with stiff, straight branches, and they are found in all parts of the United States, especially in the mountains of the East and West. Elsewhere they are cultivated on lawns, in parks or as house plants. The leaves are smooth, thick and generally evergreen. The flowers, which appear early in the summer, are large and showy and bell-like in form. They may be white, rose, purple or yellow-spotted, in color. The stamens, of which there are generally eight or ten, are very noticeable. The fruit is an oblong pod. The most common varieties are the great rhododendron, or wild laurel, which grows abundantly in the Alleghenies; the Catawba rhododendron, well known throughout Virginia; the California rhododendron, which has larger flowers; and the tiny Arctic rhododendron, common in Alaska. Few shrubs are more beautiful than rhododendrons or more responsive to cultivation. The rhododendron is the state flower of Washington and of West Virginia.

Rhône, *Rone,* a river of southeastern France. It rises in the Urner Alps in south-central Switzerland, flows southwest and south and empties into the Mediterranean Sea through the Gulf of Lyons, 25 m. w. of Marseilles. Its length is 504 m., and from Lyons its fall to the sea is at the rate of two and one-half feet per mile. The three important tributaries are the Saône, Isère and the Durance. Due to its swift current, the shifting, sand-barred mouth of its delta and the numerous islands, upstream navigation is difficult. Canals connect the Saône with the Rhine, Seine and Loire rivers. Below Lyons the course of the Rhône extends through a beautiful and fertile valley; its upper course is fed chiefly by glaciers and mountain torrents.

Rhubarb, *Roo' barb,* or **Pieplant,** a garden plant of the Rhubarb Family, cultivated for its juicy leafstalks, which when boiled with sugar are used in making desserts, pies and drinks. The plant is practically stemless, and the thick leafstalks, bearing large, wavy leaves, rise directly from the root. The leaves are a cool, dark green color and often grow to be two feet in length. The flower stalk is coarse and, when it first lengthens, is covered at the top with a yellowish-white tissue which bursts when the stalk has attained its growth, disclosing many yellowish-green flowers. Rhubarb will grow for many years in the same place, but the old leaves should be cut each year to give room for the new growth. The plant is a native of Siberia from the region of the Black Sea and is there used

as the source of the drug, rhubarb, a bitter tonic.

Rhyme, *Rime,* See POETRY, subhead *Rhyme.*

Rib'bon Fish, a peculiar family of fish, supposed to have degenerated from the Mackerel Family. The name applies to the peculiar flattened form and long, fragile build which has made this fish the foundation for many tales of sea serpents. Ribbon fish are marine fish and rarely come near shore unless driven by storm or tidal wave. Because of the porous character of both bones and flesh, the body, after death, almost entirely disappears, and this fact lends color to many astonishing tales of the marvelous character of the fish. The most striking distinguishing characteristics are: the position of the soft, narrow ventral fins which lie beneath the pectoral fins and are connected with the shoulder girdle; and the peculiar twist of the tail which is at a different angle from the rest of the body.

Ribera, *Re ba' rah,* **Giuseppe** (1588-1656), a Spanish historical painter and etcher. He was born and educated in Spain, but spent the greater part of his life in Italy, where he became the leader of the Neapolitan School. He made frequent use of the horrible, rendering martyrdoms and tortures, exhibiting a wild fancy and sometimes poetic feeling. Characteristic examples are the *Martyrdom of St. Bartholomew* and *Satyr Scourged by Cupid.*

Ricardo, *Ri kar' do,* **David** (1772-1823), an English economist, born in London. He was of Jewish parentage but entered the Church of England when he was 19, and as a result was renounced by his father, whom he had assisted in his business on the stock exchange. As a result of his private business ventures in the same line, he was a wealthy man at 25. In 1818 he withdrew from business and devoted his time to economic studies, attracted first by the works of Adam Smith. His investigations into economic theory are a valuable contribution to political science, and cover the field of taxation, protection, rent and currency. His exposition of the law of rent, based on the theories of Malthus and Anderson, was so concise that it became generally known through his works, and is often called by his name. His principal work is *Principles of Political Economy and Taxation.*

Rice, one of the most important grain crops of the world and a member of the Grass Family. Until very recently the production of rice, which is nearly 111,000,000,000 lb. annually, exceeded that of corn and wheat. Rice is an annual grass that grows from two to six feet in height and bears heads of some 100 to 200 grains each.

CULTIVATION. There are many varieties of rice, but the two chiefly raised are the Honduras and the Japan. The former is an early variety that grows tall, has a long grain and thrives in cool climates. The Japan rice has a round hard grain that grows rapidly in warm climates. The seeds are sowed broadcast or planted by means of a drill; from 60 to 70 lb. of seed are used per acre. When the plants are about six inches high the land is flooded to a depth of four inches and is left submerged for about three months. Embankments built about the fields maintain the water at the proper depth. "Stretch water" flooding, the method prevailing in South Carolina, refers to the early flooding, which is supposed to cause the leaves to stretch. By this method the fields are flooded early and after a time the water is withdrawn, the crop hoed and soon flooded again. This time the water is kept on until harvest time. Along the coast states the tides are used for flooding. Elsewhere, wells and pumping stations supply the waters through canals to the fields.

As the grain begins to yellow, the water is withdrawn and for ten days the fields are allowed to dry before the grain is harvested. Where possible, the harvesting is done by means of machines which cut and tie about eight acres per day. The bundles are placed in shocks of 16 to 20 bundles each, arranged to the best advantage to shed rain, and are dried in the field. If stacked and allowed

to sweat before going to the factory, the quality of the grain is said to be improved.

Preparation. The grain is thrashed by machines very similar to those used for thrashing wheat, but heavier. Traction engines or stationary engines furnish the power, and the outfit includes the thrasher, self-feeder, straw stacker and grain sacker. Generally between 300 and 400 sacks are thrashed per day, and the grain is placed in four-bushel sacks (44 lb. to a bushel). The rice, called paddy or rough rice, is then sent to the mills where the husk is removed, leaving the familiar white kernels valuable as food. The by-products of the milling are rice hulls, bran, meal, grits and rice polish. The rice hulls are hard and full of silica; they are harmful if fed to stock in large quantities and are used chiefly as packing. The bran is made of the outer layer and some of the inner. Rice meal is bran that is wholly free from hulls which are not always removed from the bran. Rice polish is the flour made when the rice kernels, which are naturally rough, are polished and brushed for the market. Rice polish has high nutritive value.

Statistics. In 1918 the United States, exclusive of Hawaii and the Philippines, produced 1,778,656,000 lb., which was valued at over 4c a pound or a total of $77,474,000. In the production Texas and Louisiana lead, and South Carolina, Georgia and Florida produce the remainder of the crop. The world's production averages about as follows: North America, 2,000,000,000 lb.; Europe, 2,039,300,000; Asia, 96,430,600,000. British India produces the most.

Rice, Alice Hegan (1870-), an American novelist, born in Shelbyville, Ky. She studied at Hampton College, Louisville, and in 1902 was married to Cale Young Rice, an author and dramatist. Humor, originality and faithful descriptions of real life characterize her work. She published *Mrs. Wiggs of the Cabbage Patch* in 1901, which became instantly popular, and was later dramatized. Her other works include *Lovey Mary, Sandy* and *Mr. Opp.*

Rice'bird". See Java Sparrow; Bobolink.

Rich'ard I (1157-1199), King of England, surnamed *Cœur de Lion* (the Lion-Hearted). He was the son of Henry II, whom he succeeded in 1189. In 1190 he

started on the Third Crusade, the administration of England being left to William Longchamp. Richard's brother John, however, gradually gained control of the government. Richard bore a prominent part in the Third Crusade, and stories of his great personal valor have made his name famous in romance. Acre was captured on July 12, 1191, and several months later Richard made a truce with Saladin, who had captured Jerusalem in 1187, whereby that city remained in the hands of the Turks (See CRUSADES, subhead *Third Crusade*). Setting out for home in October, 1192, Richard was seized by Leopold, Duke of Austria, while making his way through that noble's dominions. He was then detained as a captive by the Emperor Henry VI, and released only on the payment of a heavy ransom. He arrived in England in March, 1194, and soon became involved in a war with Philip Augustus of France, with whom he had quarreled during the Crusade. He was killed by an arrow while conducting a siege. Richard's exploits are described in Sir Walter Scott's *The Talisman*.

Richard II (1367-1400), King of England. He was the second son of Edward the Black Prince. On account of the death of his elder brother and his father, he was placed, when nine years of age, in the care of his uncle, John of Gaunt. The death of Edward III in 1377 left the country to Richard, who was only ten years old. When scarcely more than a lad the young king put down the Wat Tyler insurrection with remarkable boldness (See TYLER, WAT). Later he was engaged in wars with Scotland and France. He was also in frequent strife with Parliament to maintain what he considered to be his prerogatives, and a number of the nobles were deprived of their power. The earls of Warwick and Gloucester were banished and some were executed. Finally a quarrel having arisen between Henry, Duke of Hereford, and Mowbray, Duke of Norfolk, he banished them both. On the death of Hereford's father, Richard confiscated his estate. Hereford returned to the country, placed himself at the head of a strong force, captured Richard and carried him captive to London. Hereford was crowned as Henry IV in 1399 and Richard was imprisoned. It is supposed he was murdered the following year.

Richard III (1452-1485), King of England, born at Fotheringay Castle. He was the youngest son of Richard, Duke of York. When his brother became king as Edward IV, Richard was made Duke of Gloucester, and during the Wars of the Roses, he rendered the King valuable assistance. In 1469 he was made high constable of England, and in 1478, great chamberlain. In 1480-1482 he conducted successful campaigns against the Scots. At the death of Edward IV, 1483, the care of his young son, Edward V, and of the government was left to Richard; he was recognized as protector of the realm, but was opposed by the relatives of the Queen mother. He soon overcame all opposition, however, and was crowned in 1483. Edward was imprisoned in the Tower and some of his most powerful opponents were executed. It is thought that the boy was shortly afterwards put to death. The Earl of Richmond, who was the head of the House of Lancaster, decided to depose Richard. He landed in England with a strong force, and in 1485 met Richard at Bosworth, where the King was defeated and killed.

Rich'ardson, Samuel (1689-1761), an English novelist, born in Derbyshire. He was apprenticed to a printer at the age of 16, and by 1719 had set up a printing establishment of his own. His life was uneventful. It was not until after he had passed 50 that he began to write, and then only when two booksellers had advised him to compile a manual of letters which should serve as a pattern for the boys and girls in the country. This Richardson was ably fitted to do, for he had written letters since he was a child and as a youth had many times helped his timid friends with their love epistles. As a result of this suggestion originated *Pamela,* written in 1740 and notable as the first English work of fiction fulfilling the requirements of the *novel* according

to the present acceptance of the term. *Clarissa; or, the History of a Young Lady,* his greatest work, followed and aroused great interest. *The History of Sir Charles Grandison* was published in 1753. These novels are all in the form of letters. They have a definite plot, are executed with faithful observation of realistic details, portray character in an able manner and are diffused with sentimentalism. Richardson's works exercised a tremendous influence on literature, not in England alone, but also in Germany and France.

Richelieu, *Re" she lyu',* **Armand Jean Du Plessis de** (1585-1642), an eminent French statesman and cardinal. He succeeded in obtaining the favor of Maria de' Medici, the mother of Louis XIII, and was made secretary of foreign affairs. In 1622 he was made a cardinal, and two years later he was admitted into the state council. Richelieu now bent all his efforts upon strengthening the power of the King. For this purpose he put down the Huguenots as a political power, and took away many privileges from the great nobles, but he left the Huguenots liberty of worship and employed many in high offices of state. In his foreign policy Richelieu strove to raise France at the expense of the House of Hapsburg. It was for this reason that he aided the Protestants in Germany, and protracted the Thirty Years' War. By war with Spain, France lost territory, but Richelieu lent his aid to the separation of Portugal from Spain in 1640. Richelieu is ranked among the broad-minded statesmen of the world. His work made the prestige of France under Louis XIV possible. He was a patron of art and learning, the founder of the French Academy and of the Jardin des Plantes.

Rich'mond, Ind., a city and county seat of Wayne Co., 68 m. e. of Indianapolis and 70 m. n.w. of Cincinnati, on the East Fork of the Whitewater River, and on the Pittsburgh, Cincinnati, Chicago & St. Louis, the Grand Rapids & Indiana, the Chicago, Cincinnati & Louisville and other railroads. Interurban electric lines connect with the near-by towns and cities. It is the commercial center for a fertile agricultural region and has extensive manufactories of traction engines, thrashing machines, church furniture, grain drills, iron and brass goods, undertakers' supplies, farm implements, clothing, flour, dairy products, milling machinery and boilers. The educational institutions are Earlham College (Friends), opened in 1847, and St. Mary's Academy (Catholic). The Morrison-Reeves Free Library and the Richmond Law Library are located here. The city also contains the Eastern Indiana Hospital for the Insane, homes for women and orphans and St. Stephen's Hospital. The annual meeting of the Friends of Indiana is held in Richmond. The town was settled in 1816 by Friends from North Carolina. It was incorporated in 1834 and chartered as a city in 1840. Population in 1920, 26,728.

Richmond, Va., capital of the state and county seat of Henrico Co., 100 m. s.w. of Washington, D. C., on the James River at the head of navigation, 127 m. from the Atlantic Ocean, and on the Chesapeake & Ohio, the Seaboard Air Line, the Richmond, Fredericksburg & Potomac, the Atlantic Coast Line, the Southern and other railroads. The city is also a port of the Old Dominion, the Chesapeake and the Virginia Navigation Steamship lines, which connect the city with the Atlantic and Chesapeake Bay ports. The James River has been improved by the Federal Government until it now has a channel 100 ft. wide and 18 ft. deep from Hampton Roads to the wharfs of the city.

Richmond is most attractively situated, not like Rome on seven hills, but on 12 elevations rising from the two banks of the James River about 200 ft. above sea level. The climate is mild and healthful, with abundance of pure water. There is a modern street railway system, and the Seven Pines Interurban Line affords accommodation to a thickly populated region. Richmond is the leading manufacturing city of the state and the port of entry for the District of Richmond. A number of bridges cross the

river and connect the city with S. Richmond and neighboring suburbs.

Parks and Boulevards. The city contains over 276 m. of well-paved streets. There is a park system of 26 sq. m., among which are William Byrd Park of 300 acres, Chimborazo Park of 29 acres, and Joseph Bryan Park of 262 acres. Gamble's Hill and Jefferson parks and Monroe and Marshall squares are among the smaller parks of the city. The State Capitol Square of ten acres is owned by the state. Richmond is often called the "Monument City" and contains many fine monuments and statues of historic interest. Among the most noteworthy is the Washington Monument, with the equestrian statue of Washington and substatues of Patrick Henry, Thomas Jefferson, Chief Justice Marshall and George Mason, all by Thomas Crawford, and statues of Andrew Lewis and Thomas Nelson by Randolph Rogers. Nearby is a statue of General J. E. B. Stuart and one of Stonewall Jackson. At the head of Franklin Street, in Lee Circle, is the noble statue of Gen. Robert E. Lee, designed by Mercié. Several squares west of this is the great Jefferson Davis Monument. On Libby Hill is a monument to the private soldiers and sailors of the Confederacy. Just east of the city is the National cemetery, with graves of 6571 Federal soldiers. Hollywood cemetery contains the graves of many famous men, including Jefferson Davis and John Randolph and presidents John Tyler and James Monroe. A massive granite shaft has been erected to the memory of 16,000 Confederate soldiers. Oakwood cemetery also contains the graves of about 18,000 Confederate soldiers. The suburbs of the city contribute to its attractiveness, having broad shady avenues and miles of handsome residences.

Public Buildings. Chief among the noteworthy buildings is the capitol, begun in 1785 and completed in 1792. This was designed from plans and model of the Maison Carrée at Nîmes, supplied by Thomas Jefferson while he was minister to France. Additions were made to the building in 1906. In the capitol rotunda is Houdon's full length marble statue of Washington modeled from life and provided for by the Virginia General Assembly in 1784. Other historic buildings include the Old Stone House, the oldest building in the city, built in 1737, used as a museum; the Confederate Museum; the Lee Mansion, now containing a valuable library and historical portraits; and the Valentine Museum, which was given the city by Mann S. Valentine, containing over 100,000 archæological specimens. St. John's Episcopal Church is especially noted as the meeting place of the Virginia Convention in 1775, in which Patrick Henry made his famous speech ending "I know not what course others may take, but as for me, give me liberty or give me death!"

The more modern public buildings include the city hall, post office, customs-house, Chamber of Commerce and library building, containing the state and state law libraries. There are a number of public libraries and about 125 churches, which include the Monumental Church and the Sacred Heart Cathedral (Catholic), and Battle Abbey which is the Confederate museum.

Institutions. The leading educational institutions include Richmond College, coeducational; Westhampton College; the Union Theological Seminary (Presbyterian); the Virginia Mechanics' Institute; the Medical College of Virginia; the Collegiate School for girls; the Virginia Union University (colored); the Visitation, St. Peter's, St. Joseph's, St. Patrick's and Sacred Heart academies; normal schools for white and colored; several high schools; and an excellent system of graded schools. The charitable institutions include the Confederate Soldiers' Home, Home for Needy Confederate Women, St. Sophia's Home for the aged; the Memorial, St. Luke's, Sheltering Arms and city hospitals, a number of orphanages and homes for the aged. A state penitentiary is located here.

INDUSTRIES. Richmond is the chief manufacturing city of the state, and the most important industries are connected with the manufacture of tobacco, cigars and snuff. Flour and fertilizers are also manufactured extensively. The iron interests include locomotive works, agricultural-implement works, foundries and machine shops, railroad-spike works and nail and horseshoe works. Other manufactured products include tin roofing, baking powder, coffee and spices, trunks and bags, woodenware, wagons and carriages, paper boxes and twine, hats and confectionery. Shipbuilding is carried on, and the city has a large jobbing and retail trade.

HISTORY. In 1607 an exploring party from Jamestown, under command of Capt. Christopher Newport, including Capt. John Smith, sailed up the James River as far as the site of Richmond. The first permanent settlement within the present limits of the city was made in 1609, when Smith again ascended the river, purchased land from the Indians and called the place "None Such." In 1645 Ft. Charles was erected at the falls of the river as a defense, and near by, in 1676, Nathaniel Bacon defeated the Indians in the "Battle of Bloody Run." Col. William Byrd obtained grants of land in 1687, and in 1733 his son, Col. William Byrd, laid out the town and named it from Richmond on the Thames. In 1779 Richmond became the state capital and in 1782 a city charter was granted. The Virginia Resolutions of 1798-99 were passed here and here in 1861 Virginia adopted the Act of Secession. The city was the Confederate capital from May, 1861, to April, 1865, and was an important point for the Federal forces. On Apr. 2, 1865, the city was evacuated and set on fire by order of General Ewell, the Federal forces entering the city on the following day. The city of Manchester was annexed to Richmond in 1910. The city is governed under a charter effective June 1, 1919. Population in 1920, 171,667.

Richmond, Capture of See PETERSBURG, SIEGE OF.

Richter, *Rik' ter,* **Johann Paul Friedrich** (1763-1825), generally called Jean Paul, a German humorist, born at Wunsiedel, in Bavaria. On going to Leipsic in 1781, with the purpose of studying theology, he came under the influence of Rousseau and other satirists, and gradually turned wholly to the study of literature. He wandered around without definite work for several years and finally settled in Baireuth, where the last 21 years of his life were devoted to harmless and eccentric pursuits. The death of his promising and only son, Max, in 1821, was a blow from which he never fully recovered; in addition, he was severely troubled by disease during the last years of his life. The chief characteristics of his work are humor, sometimes grotesque but never vulgar, a love of nature and a fertile imaginative power. His other writings include *Greenland Lawsuits, The Invisible Lodge, Titan, Wild Oats, Levana, or Rules of Culture* and *Rules of Æsthetics.*

Rideau, *Re" do',* **Canal,** a canal connecting Kingston, Ontario, with Ottawa. In connection with the Rideau River and a chain of lakes it forms a waterway 126 m. long and navigable for barges. Since the construction of railways its importance has declined.

Ridgway, *Rij'way,* **Robert** (1850-), an American ornithologist, born at Mt. Carmel, Ill. He was zoologist on the United States geological exploration of the 40th parallel in the Western States, 1867 to 1869, and in 1880 he became curator of the division of birds in the United States National Museum. He was a founder and later president of the American Ornithologists' Union. Among his writings are *A History of North American Birds* (with Spencer F. Baird and Thomas M. Brewer), *A Manual of North American Birds, The Ornithology of Illinois* and *The Birds of North and Middle America.*

Ri'ding, when not otherwise defined, traveling horseback, and for either business, exercise or pleasure. In riding, much depends upon the size and action of the horse, much upon the saddle and

bit, and not less upon the skill of the rider and his use of spur or whip, and rein. Walking, trotting and galloping are the natural gaits of the horse; yet the true saddle animal is not only easier in these gaits but can readily be made to modify them by a shortening or quickening of his movements. The man who spends his days largely in the saddle usually stands in his stirrups, because the knee is thus kept practically straight, and he prefers a stirrup of light wood large enough to support the entire ball of the foot. But the jockey who rides in short, fierce races, and the cross-country rider, whose hunter is expected to jump fences, ditches and other obstructions, commonly uses a shorter stirrup strap, and in keeping his seat presses his knees more closely against the horse. His stirrup is likely to be only a narrow strip of iron.

The rider should learn to handle his reins easily, giving his mount as much freedom of movement as conditions warrant, and directing him by the rein or by the straight bit, except when emergencies temporarily require harsher treatment. A *fine hand* keeps the horse quiet and gives him confidence in his rider; and this is of no little importance, especially when long or high jumps must be taken, or when for any reason panic seizes other horses in the party. By proper use of his stirrups, the skillful horseman will seldom rise much from his saddle even when riding an untrained horse upon a hard, gruelling trot. The cavalry is today less essential to military service than in the past, and fewer regiments are required by the government. On this account, and also because of the development of many other sports, riding receives less attention.

Rid'ley, Nicholas (about 1500-1555), Bishop of London, educated at Cambridge, the Sorbonne, Paris, and at Louvain. While in college he became interested in the Reformation. On his return to England from Louvain he was made proctor of the University of Cambridge. He became chaplain to Archbishop Cranmer, then to the King, and passed from one promotion to another until in 1550 he became Bishop of London. He assisted in the preparation of the Forty-one Articles, afterwards reduced to thirty-nine. On the death of Edward VI, Ridley warmly espoused the cause of Lady Jane Grey, but was unsuccessful. When Mary ascended the throne, she had him imprisoned in the Tower. He refused to recant, and with Latimer was burned at the stake. He is considered one of the strongest English Reformers and one of the most eminent of the Christian martyrs.

Rid'path, John Clark (1840-1900), an American educator and historian, born in Putnam County, Ind. He graduated at Asbury (now De Pauw) University, taught in Thorntown (Ind.) Academy, was superintendent of schools at Lawrenceburg, Ind., professor of languages in Baker University, Baldwin, Kan., and professor of English and then of history in Asbury University. He became vice-president of this university in 1879 and was influential in placing the institution under the patronage of Washington C. De Pauw, whose name it took. He wrote a *Life of James A. Garfield,* a *Popular History of the United States,* a *Cyclopædia of Universal History* and other historical works which have had an extensive circulation.

Rienzi, *Ri en' zee,* **Cola di** (about 1313-1354), a Roman orator and tribune. Having aroused the people against the nobility, he induced them to establish a republican government, and when they had created him tribune, he banished the nobles or exacted their homage. His disinterestedness at first won even the Pope; but his subsequent ambition violated popular confidence and he left Rome in 1347. Later, while attempting to reclaim Rome, he was imprisoned by Charles IV and delivered to Pope Clement. Afterwards Innocent VI sent him to Rome, where he was killed. Bulwer-Lytton made Rienzi the hero of one of his novels, and this story is the basis of an opera by Wagner.

Riesengebirge, *Re' zen ge bir' ge,* a mountain range of Europe, a branch of

the Sudetic Mountains. It separates Prussia Silesia from Bohemia. The highest peak, Schneekoppe (5265 ft.), is the loftiest summit in central Germany. In most places the slopes of these mountains are heavily forested.

Ri'fle, a gun with a spiral groove plowed in the bore, giving the projectile a boring motion. This motion gives the projectile great penetrating power. Rifled firearms were in use in the Middle Ages, but seem not to have been used in war until the middle of the 17th century. There was trouble with the earlier rifles in getting the bullet to take the grooves, which were not then spiral, various devices for that purpose not proving very satisfactory. The bullet must be expanded in some way so that the soft metal will take the shape of the groove and follow it. Captain Minié of the French army invented a bullet with a hollow base into which he fitted an iron cup. Upon firing the gun the cup was driven up into the bullet, expanding it and forcing the outer portions to fit the grooves. This bullet was brought out in 1849 and adopted by the French Government. The Lancaster rifle and Enfield rifles came into use about the middle of the 19th century. In 1841 Prussia was using the breech-loading Dreyse needle gun, which gave place in Germany to the Mauser rifle in 1871. Later rifles are the magazine guns, such as the Spencer and Winchester; and the Springfield, now in use in the United States army. See BULLETS.

Riga, *Re' ga,* a seaport city near the head of the Gulf of Riga, but situated on both banks of the Duna River about eight miles from the Baltic shore. Formerly it was the Russian seat of government for the Baltic Provinces,—Esthonia, Livonia and Courland. The city consists of four parts. The old city of Riga, once surrounded by a wall, and three flourishing suburbs,—St. Petersburg, Moscow and Mitau. The latter one is on the left bank of the river. The harbor of Riga is not a good one and it is ice bound in the winter months. But by river and rail, the city is in connection with the timber sections of White Russia and the flax and hemp sections of Central and West Russia and so has an extensive commerce. It was a prominent member of the Hanseatic League. It was long under the control of Poland, then of Sweden, finally of Russia. Its future history will be that of the Baltic Provinces.

Riggs, Kate Douglas Wiggin (1859-), an American writer, born in Philadelphia and educated at Abbott Academy, Andover, Mass., and at Bowdoin College in Maine. She was married to George C. Riggs in 1895, but most of her writings have appeared under the name Kate Douglas Wiggin. She organized the first free kindergartens for poor children on the Pacific coast and has continued to interest herself in that work, but is best known for her wholesome and delightful stories for young people. Among these are *The Birds' Christmas Carol, Timothy's Quest, Rebecca of Sunnybrook Farm, New Chronicles of Rebecca, Susanna and Sue* and *Mother Carey's Chickens. Rebecca of Sunnybrook Farm,* one of her most charming stories, has been very successfully dramatized. Mrs. Riggs has also written articles on kindergarten work and volumes of verse for children.

Right Ascen'sion, distance measured in degrees or time on the celestial meridian westward from the first point of Aries. If the sidereal clock be set at 0 h., 0 min., 0 s., when the first point of Aries is on the celestial meridian, then, as soon as the celestial sphere has turned from west to east through 15 degrees, the clock will register one hour; and when the entire revolution has been made (360 degrees) the clock will show 24 hours. When a star comes upon the meridian of the observer the clock will tell how far the star is east of the first point of Aries, or its *right ascension.* Right ascension on the celestial sphere corresponds to longitude on the earth. See DECLINATION; CELESTIAL SPHERE; MERIDIAN.

Right of Way, the right of one person to pass over land belonging to an-

other. If the right is restricted to a limited number it is private; if not restricted, public. An undisturbed use of a right of way for 20 years makes it a permanent easement or prescription. When one person sells another a piece of land having no road or way leading to a highway, the purchaser has the right to cross the seller's land by the nearest practical way, having due regard to the rights of the vender. See PRESCRIPTION.

Rights, Bill of. See BILL OF RIGHTS.

Riis, *Rees,* **Jacob August** (1849-1914), American journalist, social reformer and author, born at Ribe, Denmark. In 1870 he came to America, and worked for some time as a carpenter and cabinetmaker in New York City, later being connected with a newspaper there. He afterwards became police reporter for the *Sun,* New York City, at the time when Theodore Roosevelt was police commissioner, to whom he was able to be of material assistance. During this period he made a careful investigation of the slums of New York City, and was the instigator of important reforms, securing the establishment of many small parks in congested districts, and considerable relief for the crowded population of the tenement houses. He published some important books that have attracted considerable attention, among them *How the Other Half Lives, The Battle with the Slum, The Making of an American* and *Theodore Roosevelt, the Citizen.*

Ri'ley, James Whitcomb (1853-1916), an American poet, born in Greenfield, Ind. His father was a lawyer, but Riley's attempts at following the profession were futile, for he forgot the law as soon as he had learned it, and he became instead a wandering actor, musician and sign painter. He served on the Indianapolis *Journal,* in which he published his earliest verse, first becoming known to the public by the pen name of Benjamin F. Johnson, of Boone. Later he settled in Greenfield, where he engaged in literary work, both in writing and as a public reader. He used the "Hoosier" dialect and pure English alternately, and because of his intimate knowledge of rural life and manners he has succeeded in lending to his work a tenderness, sincerity and simple humor that place him in the front rank of American authors who have remained content to touch only on themes dealing with homely country life. He is the poet of childhood and has produced many juvenile verses distinguished for their quaintness and originality. His works include *The Old Swimmin' Hole and 'Leven More Poems, Afterwhiles, Old-Fashioned Roses, Pipes o' Pan, Rhymes of Childhood, An Old Sweetheart of Mine, Green Fields and Running Brooks, Morning, The Little Orphant Annie Book* and *Old Schoolday Romances.*

Rin'derpest, an infectious disease common among the cattle of Europe and Asia. It is caused by a tiny bacterium whose life habits are not thoroughly known. The disease affects the body through the digestive system and manifests itself in a high fever, weakness, inflammation of the eyes, ulceration of the mucous membrane of the nose and throat, and other organic derangements. The disease often proves fatal, and a thoroughly reliable cure is as yet unknown. Inoculation is a preventive and is widely used whenever a plague seems imminent. Infected animals should be killed and the stables carefully disinfected. Hides and horns of diseased cattle have sometimes been sold and the infection has thus been spread. As yet, however, it is unknown in North America. Rinderpest is sometimes known as cattle plague.

Ring Ouzel, *Oo' z'l.* See OUZEL.

Ring'worm", a contagious disease of the skin, caused by a tiny fungus which feeds upon the tissues. As it is an affliction attacking the hair bulbs, it frequently appears on the scalp, causing loss of color, brittleness in the hair and sometimes loss of the hair, and bald spots. An ointment containing some compound of mercury will destroy the fungus.

Rio de Janeiro, *Re' o da Zha na' ro,* a city of South America, the capital of

Brazil, situated on the Bay of Rio de Janeiro. The bay, extending inland for 17 m., is surrounded by forest-covered mountains; the city climbs up their steep sides and spreads over the enclosed valleys. There are several large squares, and the streets are narrow and long. The principal buildings embrace the Senate House, the mint, the city hall, the Imperial Palace, now the National Museum, the Candelaria Church, the National Library, the Historical and Geographical Institute, the observatory, the Polytechnic School and several educational and charitable institutions. The Santa Casa da Misericordia Hospital is one of the largest institutions of its kind in the world.

The harbor is large and has extensive dock facilities, the commercial quays being about 3800 yards long. Communication is maintained with the chief ports of Europe and America, and the inland railway service is good. The manufactures include flour (the wheat being imported), textiles, clothing, refined sugar, macaroni, biscuits and fruit conserves. The principal export is coffee; others are sugar, tobacco, cigars, tapioca, hides, diamonds and gold. Rio de Janeiro was first settled by the French Huguenots in 1555. It was captured by the Portuguese in 1557, and its present name was given to it ten years later. The discovery of gold near the end of the 17th century increased its importance, and in 1762 it was made the capital of all Brazil. Population in 1909, estimated at 1,000,000.

Rio de Oro, *Re' o da O' ro,* a Spanish possession of East Africa lying upon the Atlantic and inland, surrounded by the French possessions and the Sahara. The country is mostly desert with few oases, and the population, in consequence, is limited; it consists almost entirely of Arabs and Berbers, all of Mohammedan faith. The Spanish settlement is upon a peninsula and the nearby islands. The nomadic tribes rear cattle, sheep and camels. Esparto and manzanilla are the only crops that grow well. Population, about 12,000.

Rio Grande, *Re' o Grahn' day,* a river of the United States, rising in the San Juan Mountains in the southwestern part of Colorado and flowing in a southeastward direction into the Gulf of Mexico. It crosses New Mexico and forms the entire boundary between Texas and Mexico. Its length is about 1800 m., and it is navigable for small boats for 500 m. Its chief tributary is the Pecos. In New Mexico the water is used for irrigation, and in sections the river bed is dry during a portion of the year.

Rio Negro, *Re' o Na' gro,* a river of South America. It rises in the southeastern part of Colombia, flows south and southeast and after a course of 1000 m. joins the Amazon at Manáos, Brazil. Through the Cassiquiare it is connected with the Orinoco. The same name is given to a smaller stream of Colombia; also to a river in Uruguay, about 300 m. long.

Riordan, *Reer' dan,* **Patrick William** (1841-1914), a Roman Catholic prelate, born in New Brunswick. He was educated at Notre Dame, Ind., and at Louvain, Belgium, where he graduated in 1864. He had the chair of theology at the Seminary of St. Mary's of the Lake, Chicago, and during 1868-71 was pastor of St. Mary's Church, Joliet, Ill. Until 1883 he was in charge of St. James, Chicago, when he was consecrated titular Archbishop of Cabesa, and made coadjutor. The following year he became Archbishop of San Francisco.

Ripa'rian Rights, the rights of a person owning land bordering upon a river or other body of water, to the use of the banks and the water. By common law the owner of land bordering on a stream that is not navigable owns the bed of the stream to the middle line and has a right to use the water, but he cannot stop all the water even though he allows it to pass again; neither can he pollute the water nor use it in such a manner as to interfere with the rights of those farther down the stream.

Rip'ley, George (1802-1880), an American scholar and critic, born at Greenfield, Mass. He studied at Har-

vard, was ordained a minister in 1826 and settled in Boston until 1841. His interest in Transcendentalism was fundamental, for he was one of the originators of the movement in America and was the founder of *The Dial,* a magazine edited in the interests of the school from 1841 to 1844. He also established the "Brook Farm Institute of Education and Agriculture." When the Brook Farm failed, Ripley was left without money, but it was then that he turned to the literary work on which his chief fame rests—his criticisms as literary editor of the New York *Tribune.* With Charles A. Dana he edited both the original and the revised edition of Appleton's *New American Cyclopædia.* He also translated and published a series of 14 volumes of *Specimens of Foreign Standard Literature.* See Brook Farm.

Rit'ter, Karl (1779-1859), a German geographer, born in Prussia and educated at Halle. In 1820 he became professor extraordinarius of geography at Berlin University, and he was subsequently a member of the Academy and director of studies at the Military School. Ritter founded what is known as general comparative geography. His most important works are *Geography in its Relation to Nature and the History of Men,* a 17-volume publication; *Europe, a Geographical, Historical, Statistical Picture;* and *The Stupas.*

Riv'er, a long stream of water which flows with a perceptible current across the land, usually without cessation throughout the year, in a definite channel of its own construction. Rivers are among the most widely distributed of natural bodies of water. It is only in desert regions and areas of perpetual snow that they are not to be found. They constitute the great drainage systems for the land. Rivers carry about 6500 cu. m. of water to the sea each year. This water is collected from various sources, but chiefly from rain and melted ice and snow. When rain falls upon the ground, some of it seeps into the soil to appear later on the surface as springs; but a large part of it, following the depressions and irregularities of the ground, is collected into rivulets. The uniting of many rivulets results in the formation of a brook, and several brooks produce a permanent stream. In the valleys or larger depressions of the land, all the streams of an area come together and a river is formed. The small streams which feed a river are called its tributaries; a river, together with its tributaries, is known as a river system; the territory drained by a river system is a river basin. The elevations of land which separate the headwaters of two river systems is called a watershed, or divide.

Rivers usually carry suspended in their waters a considerable quantity of solid substance, such as sand, gravel and mud, as well as a large amount of dissolved mineral matter, including salts and alkalies. The saltiness of the sea may be due to the deposition of salt by the rivers throughout the ages. This solid material has been washed down to the rivers from the land faces by surface water. Mineral water is usually carried by springs. It is estimated that the Mississippi River deposits each year in the Gulf more than 400,000,000 tons of sediment. The work of running water in reducing the land and getting it to the sea is one of great magnitude. The more solid particles a river carries the greater its cutting or wearing power, and the swifter the current the more and larger particles it can carry. In times of flood, rivers sometimes transport huge stones and boulders many miles by rolling them along their beds. See Erosion.

The velocity of a river depends upon the slope of the land; its volume, or the amount of water; its load, or the amount of solid matter which it carries; and the shape of its channel. The reasons for the first two are obvious; the reason for the third is that the carrying of sediment uses up a large portion of a river's energy for lifting, which otherwise would be directed to flowing. A river flows faster in a deep, narrow channel than in one which is shallow, because the shallow channel offers a large surface

of contact and the water is impeded by friction. When a river flows slowly, it wears away its banks; when it moves swiftly it erodes its bed. Thus in a level country the river channels are broad and shallow; in mountainous regions where the slopes are steep and the current swift, they are deep and narrow. Exceptionally striking examples of such formation are called gorges and canyons. The canyon of the Colorado River is in places a mile in depth. Another exceptional natural feature caused by bed erosion is the natural bridge over a river formed where there has been a waterfall (See CATARACT). If a weak section of rock occurs in a river just above a fall, the water may wear its way downward at that point and find its way out underneath the ledge of rock which had supported the fall, leaving the ledge across its channel. Rivers flowing through level plains often double upon their course and form loops or meanders. A flood or overflow often breaks the narrow neck of one of these loops, cutting a channel, which the river thereafter follows, leaving the loop thus cut off as a crescent-shaped or ox-bow lake. Again lakes, due to an obstruction of a river, such as that caused by glacial action, occur in the river itself, being merely an enlargement or widening of the river at such points. Underground rivers are not unusual. That of Mammoth Cave is a conspicuous example.

Rivers are among the most beneficial and at the same time the most destructive of natural agencies. They drain the land, and their valleys are so productive that they always attract a dense population. The silt deposited in their flood plains is a wonderful fertilizer. But they have been the cause of inestimable loss of life and property, when floods occur. See DRAINAGE; VALLEY.

River Raisin, *Ra' z'n,* **Battle of the,** an engagement of the War of 1812, fought at Frenchtown, now Monroe, on the River Raisin, Michigan, Jan. 22, 1813. On Harrison's march to Detroit, a detachment of about 1000 Kentuckians under Winchester reached Frenchtown, where they met Proctor with a large body of British and Indians. The Americans were defeated in the battle which took place and the usual Indian massacre occurred. "Remember the River Raisin" was the rallying cry of the surviving Kentuckians for a long time afterwards.

Riverside, Cal., a city and county seat of Riverside Co., about 60 m. e. of Los Angeles, on the Santa Ana River and on the Southern Pacific, the Atchison, Topeka & Santa Fe and the San Pedro, Los Angeles & Salt Lake railroads. The Pacific Electric interurban line also extends to many neighboring towns and cities. The city is beautifully situated in the San Bernardino Valley about 800-1000 ft. above sea level. The climate is delightful, and the city is famous as a winter and health resort. Riverside is the center of the best irrigated section of the state, and the great industry is the cultivation of oranges and lemons, the annual production being about 2,000,000 boxes. Alfalfa, grain and deciduous fruits also are cultivated. Near Huntington Park is the state citrus experiment station, with an experimental orchard of 20 acres. The Albert S. White Park contains a notable collection of cacti and tropical flowers. Huntington Park has a beautifully shaded automobile drive, which extends to Mt. Rubidoux, overlooking the city. Magnolia Avenue, ten miles long, is bordered with pepper trees, and Victoria Avenue is likewise parked with trees and flowers.

Architecturally, Riverside is unusually attractive. The most prominent buildings are the courthouse, high school, a Carnegie library, Y. M. C. A. Building, costing $100,000, Glenwood Mission Inn, a fine theater and numerous handsome churches. The Sherman Institute, a United States Government Indian industrial school, trains the pupils in industrial arts. The cultivation of navel oranges was first introduced into the United States from Brazil at Riverside in 1873. Artesian wells are the source of the city's water supply. There are no saloons in the city. Riverside was set-

tled in 1870 and chartered as a city in 1883. Population in 1920, 19,341.

Rives, *Reevz,* **Amélie,** PRINCESS TROUBETZKOY (1863-), an American novelist, born in Richmond, Va. She studied under private tutors and early began to write stories, some of which were published in the *Atlantic Monthly.* In 1888 appeared her first collection of tales, *A Brother to Dragons, and Other Old-Time Stories.* The same year she was married to J. A. Chanler, of New York, from whom she was divorced, and later became the wife of Prince Troubetzkoy of Russia. Her novel, *The Quick or the Dead,* aroused widespread interest. She also wrote *Herod and Mariamne, According to St. John, Barbara Dering, Athelwold, Tanis, Seléné, Augustine, the Man, The Golden Rose* and *Trix and Over-the-Moon.*

Riv'eting Machine, or **Riv'eter,** a machine used for driving and heading hot rivets in making joints in structural work, boiler work, tank work, etc. Riveters are built in a variety of forms, and are operated either by steam, by compressed air or hydraulic power. A common form of portable riveter is a U-shaped frame, or yoke, having at the ends of its arms projecting rods, one of which forms a stationary die to hold against the rivet, while the other slides in and out for the purpose of squeezing or striking the head of the rivet lengthwise when it is inserted hot in the hole. This form is usually operated by steam acting on a piston within a cylinder, while large stationary riveters are generally operated by hydraulic power. Light, portable riveters for riveting structural work in putting up tall buildings are operated by compressed air, and are known as pneumatic riveters. These strike a succession of blows, sometimes as many as 1000 in a minute. In order to do this, a reciprocating motion is produced by the action of compressed air on a solid piston sliding in a cylinder and driven sharply against the head of the rivet. There is a die in the end of the piston that shapes the head. The operator grasps the machine by its handle, with his finger or thumb on the lever controlling a valve, and as long as this lever is held down, the blows continue. The air is delivered through a flexible, wire-wound rubber tube connected with the air compressor. See AIR COMPRESSOR; PNEUMATIC TOOLS.

Rivière du Loup, *Re" vyar' du Loo',* or **Fraserville,** a city of Canada in the Province of Quebec, on the St. Lawrence River at the mouth of the Rivière du Loup, and on the Intercolonial and the Temiscouata railways, 210 m. n.e. of Quebec. The city is a summer resort possessing good facilities for fishing and hunting. The city contains railway repair shops, tanneries, grist, pulp and shingle mills, a foundry, machine shops, a creamery and a chair factory. Population in 1911, 6774.

Road, a way for travel, usually for vehicles, and used as a means of communication between places. The first roads were doubtless footpaths made by men and animals, and little attention was given to making roads until the invention of the wheeled vehicle. Among the nations of antiquity the Babylonians and Egyptians constructed roads that required a good degree of engineering skill. But the Romans were the great road builders of ancient times. Their main roads extended from Rome to different parts of the empire, and so well were they constructed that portions of them are still in use, though they were completed more than 2000 years ago.

For several centuries following the downfall of the Roman Empire little attention was given to roads, and throughout Europe they were in a very bad condition. In the 14th century France and England began to improve their roads, and from that time to the present day road making has received careful attention, so that now, with possibly the exception of Russia, all European countries have excellent roads. The roads in the United States are inferior to those in Europe. The principal reasons for this are the great extent of the country, the short time in which large portions have been settled, and lack of

uniformity in the construction and management of roads. The road mileage of the United States exceeds many times that of the railways, and to put these roads in good condition would require an expenditure far exceeding that invested in railways. The newer states at least are not able to assume such a burden. But more disadvantageous than both of these conditions is the lack of uniformity in policy or system. The National Government has charge of roads only in national parks, and all others are in charge of their respective states. In most states the care of the roads is intrusted to the townships, but in some they are in charge of the counties. Under either system petty local officials are appointed to keep the roads in repair, and only a small tax is provided for the purpose, so that little of permanent value has been accomplished.

The first general movement in the interest of good roads throughout the country was inaugurated by the American Wheelmen's Association in 1890. This movement was the result of the advent of the bicycle, and led to the organization of the National Good Roads Association, with branch organizations in every state. This association holds annual meetings. Owing to its influence many states have created state road commissions and are constructing good roads. The United States Department of Agriculture has a division devoted to the construction of good roads. This division publishes bulletins of information which are distributed free to those who ask for them. It also maintains "good roads trains," which are equipped with the most approved road-making machinery and in charge of skillful road engineers. These trains visit all parts of the United States. The train's arrival at a designated state is advertised several days in advance. The engineer explains the best methods of road making, and then under his direction a short piece of model road is made. The use of the automobile also makes better roads a necessity, especially since the auto truck is rapidly coming into use.

Road Runner, or **Chap"arral' Cock,** a bird of the Cuckoo Family. This peculiar bird is at once recognized by its long tail, elongated body and short wings. The upper parts are streaked with brownish-white; the chest is streaked with black; and the throat and under parts are whitish. The large crest on top of the head, as well as the front part of the back, is blackish with bronzy-green reflections. The bare space surrounding the eye is orange and blue. The long tail is blue-black and bronzy-green, the tips of all but the middle feathers having large, white, terminal spots. The bird is about two feet in length. The nest is placed in low trees, bushes or cactus plants, and is made of sticks, lined with grass, feathers, bark, roots, mesquite pods, snakeskins or manure chips. It contains four to six yellowish eggs. The name road runner is given these birds on account of their habit of racing down the road in front of vehicles or horsemen, darting aside when fatigued and stopping by throwing the long tail over the back. The road runner lives in southwestern United States and in Mexico.

Roanoke, *Ro' a noke",* **Va.,** chief city of southwest Virginia in Roanoke Co., 179 m. w. of Richmond and 227 m. s.w. of Washington, on the Roanoke River and the Norfolk & Western and the Virginian railroads. The city is 907 ft. above sea level and is situated in the beautiful Roanoke Valley, a part of the Valley of Virginia. Its picturesque location and its proximity to noted sulphur springs make it a prominent health resort. Roanoke covers an area of 5½ sq. m., has a well-equipped local and interurban trolley system, an artificial gas plant, a telephone system and an excellent water supply. Electric current is furnished from plants on Roanoke and New rivers and from a steam-power station. The municipally-owned parks are Elmwood, Highland and Melrose, while Kimball, Crystal Springs, Mountain and Mill Mountain parks are privately owned. The latter is on top of Mill Mountain, a beautiful eminence overlooking Roanoke from the southeast and

giving magnificent views many miles around.

The noteworthy buildings include City Hall, Masonic Temple, Elks' Home, Eagles' Home, Federal Building, National Exchange Bank, First National Bank, Payne, Strickland, Terry, Thomas, Times and Watt & Clay buildings, Norfolk & Western office buildings, a Y. M. C. A., Jefferson and Roanoke theaters, Academy of Music, five hospitals and six steam and motor fire houses. There are several hotels, including the Hotel Roanoke, the Ponce de Leon and the Shenandoah. Other buildings are St. Vincent's Orphan Asylum, two business colleges, about 40 churches and numerous handsome residences. The excellent school system includes a high school, an intermediate school with vocational training and domestic science departments, six primary schools, two schools for colored pupils and St. Andrew's parochial school. Near the city are Hollins, Roanoke Woman's and Virginia colleges for girls, Roanoke College for boys and Daleville College for boys and girls.

Roanoke is the general office and shop headquarters of the Norfolk & Western Railway, its plant covering 60 acres; and is the midway point of the Virginia Railway. The manufacturing enterprises include railway shops, two structural iron and steel plants (one also building steel cars), furnaces, foundries, machine works, a pyrites mill, printing shops, marble and granite works and manufactures of tramways, tin cans, staves and barrels, wooden and metal products, type cabinets, store fixtures, twine, overalls, beer, soft drinks, flour and feed, confectionery, lumber and medicines. Stock raising, fruit growing, trucking, canning and coal and iron mining are the most important district industries.

Big Lick station, established by the Virginia & Tennessee Railroad in 1852, was incorporated as a town in 1874. The name was changed to Roanoke in 1882 and a city charter granted in 1884. Population in 1920, U. S. census, 50,842.

Roanoke Colony, Sir Walter Raleigh's settlement on Roanoke Island in 1585, by 108 colonists. Ralph Lane was governor of what at first was an enthusiastic band. Though they raised tobacco, maize and potatoes, provisions began to fail, and all but 15 returned to England with Drake. Those remaining soon perished. John White headed another unsuccessful expedition in 1587. In 1588, two relief ships under his command were forced to put back to England. Though Raleigh had then spent about $200,000 in attempts to colonize Virginia, White was again sent to Roanoke in 1590, but no traces whatsoever were found of the earlier colonists.

Roanoke Island, an island off the eastern coast of North Carolina, between Albemarle and Pamlico sounds. During the Civil War it was the gateway to Confederate defenses south of Norfolk, and a guard for the safe landing of supplies at that place. Besides being protected by the earthworks, Pork Point, Weir's Point and Ft. Blanchard, it was garrisoned by Gen. Henry A. Wise, with 3000 men, against whom General Burnside and Commodore Goldsborough landed 7500 Federals on the night of Feb. 7, 1862. The following day they scaled the breastworks in one mad rush, capturing nearly all the defenders.

Roanoke River, a river of the United States formed in the southern part of Virginia by the junction of the Dan and the Staunton. It flows southeastward through North Carolina and enters Albemarle Sound. Its length is about 240 m., and steamers can ascend it 75 m., to Weldon.

Rob'bery, a form of larceny in which property is forcibly taken from one's person or from under one's immediate protection by force or intimidation. Force and intimidation distinguish robbery from other forms of larceny. Picking one's pocket by stealth or snatching one's purse, if the thief is not resisted, is larceny, not robbery. Highway robbery is forcibly depriving travelers of their property on the highway or on the streets of a city. Formerly robbery was considered a capital offense. It is now punished by imprisonment.

Robbia, *Rob' byah,* **Del'la,** the name of a celebrated family of Florentine sculptors who flourished for nearly 150 years. The most celebrated was Luca Della Robbia (1399-1482). He was the son of a shoemaker and was early apprenticed to a goldsmith. However, he soon gave up this trade to become a worker in bronze and marble. He attained great fame as a sculptor and is most widely known for his *Singing Galleries,* a series of panels containing groups of children dancing, singing and playing on musical instruments. One of these, the *Choir Boys,* is frequently seen in schoolrooms. Luca was also the inventor of the process of enameling terra cotta. His works are characterized by grace of movement and naturalness of form.

His nephew, Andrea Della Robbia (1437-1528), was his pupil and became his worthy successor. Andrea worked almost exclusively in terra cotta, and though his works do not show the grandeur of conception possessed by Luca, they are characterized by exquisite taste and feeling, and some of them are remarkable for their beautiful coloring.

Rob'erts, Charles George Douglas (1860-), a Canadian poet and storywriter, born at Douglas, near Fredericton, New Brunswick. He studied at the Fredericton Collegiate School and at the University of New Brunswick, and edited *The Week,* of Toronto (Goldwin Smith's newspaper), for a short time. After teaching at King's College, Nova Scotia, for ten years, he later became associate editor of the *Illustrated American* of New York, and devoted all his time to literary pursuits. He first gained renown as a poet with a gift of melody, and showed himself especially apt in depicting nature. Later he wrote very successful prose, becoming a rival of Ernest Thompson Seton in the imaginative treatment of wilderness life. His writings include *The Heart of the Ancient Wood, The Kindred of the Wild, Earth's Enigmas, Songs of the Common Day, In the Deep of the Snow* and *A History of Canada.*

Roberts, Sir Frederick Sleigh (1832-1914), Earl of Kandahar, Pretoria and Waterford, a British soldier, born at Cawnpore, India. He studied at Eton, at the Royal Military College at Sandhurst, and at the college of the East India Company at Addiscombe, England. His early service in the army in Afghanistan, at Lucknow, Agra and Cawnpore won for him the Victoria Cross. In the Afghan War in 1878 he was commander of a division, the following year he took Kabul and in 1880 he entered Kandahar and brought the war to a close. He was now sent to South Africa as commander-in-chief; in 1885 he became commander-in-chief of India; and from 1895 to 1899 was in command in Ireland. He went from there to South Africa again, bringing about the annexation of the Orange Free State to the British Empire, and a little later, of the Transvaal. He then returned to England, was decorated with the Order of Merit, made Earl of Kandahar, and retired in 1904. He died in France while visiting the Indian troops.

Rob'ertson, James (1742-1814), "the Father of Tennessee," an American frontiersman, born in Virginia. He early removed to North Carolina and in 1770, with Daniel Boone, emigrated into Tennessee and settled on the Watauga River. In 1779 he headed a party to the Cumberland, and on Christmas Eve they reached the present Nashville. The settlement there established was erected into a county of North Carolina, with Robertson its first representative. Subsequently he was brigadier-general in the "Territory South of the Ohio River," and when Tennessee became a state, sat in the Legislature.

Robertson, James Wilson (1857-), a Canadian educator, born in Scotland. He came to Canada in 1875 and engaged in farming, in managing cheese factories and in exporting food products to England. Later he was successively professor of dairying in the Ontario Agricultural College, nonresident lecturer on dairy husbandry at Cornell University, dairy commissioner of Canada and agriculturist to the experi-

mental farm in Ottawa, commissioner of agriculture and dairying for Canada and principal of Macdonald College. Dr. Robertson, who is a world authority on butter and cheese production, has done more than any other man to regenerate Canadian agriculture.

Robertson, John Ross (1841-), a Canadian journalist, born in Toronto and educated at Upper Canada College. While at college he learned printing during his spare time and was soon issuing a schoolboys' paper, *College Times,* which later, as a monthly publication by the name of the *Boys' Times,* existed from 1857 to 1860. In 1861 he equipped an office and began issuing *Sporting Life,* and he subsequently continued the publication of the *Grumbler,* a satirical weekly. After being associated with the *Leader,* the *Globe* and the *Daily Telegraph,* Mr. Robertson went to London, England, where for three years he was resident correspondent and business representative of the Toronto *Daily Globe.* Returning to Canada in 1875, he was connected for a short time with the *Nation* and in 1876 established the *Evening Telegram,* which for years he has owned and conducted. He has sat in the House of Commons as an Independent Conservative. Mr. Robertson's separate works include much on freemasonry.

Robespierre, *Ro" bes pyar',* **Maximilien Marie Isidore** (1758-1794), a leader in the French Revolution. He was a lawyer and, for a short time, criminal judge. In 1789 he was elected a delegate to the States-General, and from the very first was grouped among the most radical members. His earnestness soon won him such attention in the Assembly and the Jacobin Club that when Mirabeau died in 1791, he became the leader of the Revolution. In 1792 he started a newspaper called *The Defense of the Constitution.* He strongly favored the immediate execution of Louis XVI. In July, 1793, he was elected a member of the famous Committee of Public Safety. He hated Danton and after he had accomplished his downfall in April, 1794, Robespierre was sole ruler of France for three months. As the French armies gained victories, Robespierre's power declined, while his simple earnestness and Puritan views, which stirred the Parisians to laughter, hastened his downfall. He was openly attacked in the Convention in July, 1794, and guillotined the next day; more executions followed on the two succeeding days, and the Reign of Terror came to an end. Although his name is generally associated with the worst excesses of the Reign of Terror, it should be remembered that he was working toward an ideal state of society, and that he believed that only by extreme measures could he accomplish his aims.

Rob'in, a bird of the Thrush Family. The American robin is too well known to require a description. In many places its arrival is heralded as the advent of spring. The robin is usually very common in cultivated districts, where it destroys vast numbers of noxious insects, especially during the season when there are young in the nest. On account of its fondness for cherries and other small fruits, it is in bad favor with the farmer, but the good which it does far outweighs the damage caused by its depredations. The nest is placed in fruit or shade trees and also in nooks about dwellings. It is composed of twigs, grass, string, paper, etc., mixed with much mud, and may be placed from 4 to 35 ft. from the ground. Four or five bluish eggs are laid. Two or three broods are raised in a season, the young leaving the nest when 11 days old. The robin was first named robin redbreast by the early colonists on account of its resemblance to the little robin of England.

The American robin ranges throughout North America, wintering from southern Canada to Mexico and Florida.

Robin Redbreast, or **English Robin,** a bird of the Warbler Family. This bird is about five inches in length. The upper parts are olive-brown and the lower parts are white; the throat, forehead and breast are brownish-orange. The female is smaller, with more subdued colors. The nest is made on the ground, usually

under a bush or hedge. Five or six pinkish-white eggs spotted with purple are laid. The redbreast is one of the most familiar of European birds. It is tame and frequently will voluntarily enter houses in search of food. Its song is sweet and melodious, and is a most welcome sound during the bleakness of winter. The robin redbreast is famous in English nursery tales and folk lore. Wordsworth, in his *Redbreast Chasing the Butterfly,* says:

> Art thou the bird whom Man loves best,
> The pious bird with scarlet breast,
> Our little English robin?

Rob'inson, Edward (1794-1863), an American scholar, born in Southington, Conn. He was educated at Hamilton College and from 1826 to 1830 traveled in Europe, having meanwhile been instructor in Hebrew in Andover Theological Seminary, where he later held the chair of Biblical literature. After 1837 he was professor of Biblical literature in Union Theological Seminary, New York. His two visits to the Holy Land, in 1838 and 1852, resulted in his *Biblical Researches in Palestine, Mount Sinai and Arabia Petræa,* a work of far-reaching influence.

Robinson, John (about 1576-1625), minister of the Pilgrim congregation which fled from England to Holland in 1608. His early life is somewhat uncertain, but he was probably born in Lincolnshire, England, and entered Cambridge, where he is supposed to have received the master's degree. Suspended from the ministry of the established Church because of his Puritan doctrines, he became pastor of the Independent, or Separatists', congregation at Scrooby, Nottinghamshire. In 1608 he and his congregation emigrated to Holland to escape persecution. Remaining in Amsterdam for about a year, they finally settled in Leyden in the summer of 1609. Here he gained a high reputation as an advocate of Calvinism, and became a member of the university. He took great interest in the plans for establishing a Pilgrim settlement in the New World, and bade God-speed to the members of his congregation who sailed in the *Mayflower* in 1620. His opponents regarded him as "the most learned, polished and modest spirit that ever separated from the Church of England." He wrote a large number of books and treatises.

Rochambeau, *Ro" shahn" bo',* **Jean Baptiste Donatien de Vimeur,** COUNT DE (1725-1807), a French marshal, born at Vendôme. He prepared for the priesthood at the Jesuit college at Blois, but entered the army on the death of his elder brother, 1742, and fought in the War of the Austrian Succession and in the Seven Years' War. In 1769 he was made inspector-general of the French army, and on July 10, 1780, he arrived at Newport, R. I., in command of 6000 French troops as an aid to the American colonists. By this time Rochambeau had become a lieutenant-general. He remained inactive in Rhode Island for a year, but, later, having placed himself completely under Washington's command, ably assisted about Yorktown. He returned to France in 1783, after receiving the thanks of Congress. He was appointed governor of Picardy and Artois and, in 1791, was given the rank of marshal. Subsequently he took command of the Army of the North, but resigned in July, 1792. During the Reign of Terror he escaped the guillotine only by the fall of Robespierre. Napoleon restored him to his former rank and estates.

Roch'ester, Minn., a city and the county seat of Olmsted Co., about 70 m. s.e. of St. Paul, on the south fork of the Zumbro River, and on the Chicago Great Western, the Chicago & North Western and other railroads. The city is surrounded by an agricultural region, of which wheat is an important crop. Much attention is given to stock raising. Valuable water power is supplied by the river; and among the manufactures are cameras and flour. There are machine shops, a foundry, gristmills, a large grain elevator and stockyards. Rochester is the seat of St. John's School and the Academy of Our Lady

of Lourdes (both Roman Catholic), of St. Mary's Hospital, founded and maintained by the Sisters of St. Francis, and of a state hospital for the insane. The city has also a public library, a courthouse, city hall, an opera house, an Odd Fellows' Building and a Masonic Temple. Settled in 1854, the place was incorporated in 1858. Population in 1920, 13,722.

Rochester, N. H., a city of Strafford Co., 35 m. n.e. of Manchester and about 30 m. n.e. of Concord, on the Cocheco and Salmon Falls rivers and on four divisions of the Boston & Maine Railroad. There is excellent water power, and the city is the commercial and industrial center of a large part of Strafford County. The chief manufacturing establishments include woolen mills, shoe factories, brickworks, box factories and lumber mills. The Gaffney Home for the Aged is located here. Rochester was incorporated as a town by royal charter in 1722 but was not settled until 1728. In 1891 it was chartered as a city. Population in 1920, 9673.

Rochester, N. Y., a city, port of entry and county seat of Monroe Co., 70 m. n.e. of Buffalo, 230 m. w. of Albany and 605 m. e. of Chicago, on the Genesee River 7 m. from its mouth, where it flows into Lake Ontario, and on the Erie, the Lehigh Valley, the West Shore, the Pennsylvania, the Buffalo, Rochester & Pittsburgh, the New York Central & Hudson River and other railroads. A number of steamboat lines connect the city with lake ports. Transportation is also given to Toronto, Coburg, Thousand Islands and other Canadian points across the lake. The Erie Canal traverses the city from east to west and is carried across the Genesee River on a stone viaduct 850 ft. long and 45 ft. wide. The Barge Canal will, when complete, give a waterway connection with the Great Lakes and the Hudson River. Within the city limits are the noted Genesee Falls, three cataracts 96 ft., 83 ft. and 26 ft. in height, which afford excellent water and electrical power and give the name of the "Power City" to Rochester. The city is situated on high plateaus on either side of the river, and ten bridges, road and railway, connect the two portions of the city. The street-railway system covers the city thoroughly, and interurban lines connect with the neighboring cities, Irondequoit Bay, Ontario Beach and other lakeside resorts. Rochester ranks high among the manufacturing cities and is the center of the nursery industry of the United States. The city is the port of entry for the Genesee customs district and exports vast quantities of farm, garden, dairy and fruit products. Canadian wheat and lumber are included in the imports.

Parks and Boulevards. Rochester is attractively laid out with broad and regular streets and fine avenues, and has many handsome residences. East, West, Lake and Plymouth avenues are among the most beautiful residence streets of the city. The park system was planned by Frederick Law Olmstead, the noted landscape architect. There are five large parks, Durand-Eastman, Genesee Valley, Seneca, containing the zoological gardens, Maplewood and Highland parks and 15 small parks, among the number being Washington Square, which contains a soldiers' monument surmounted by a statue of Lincoln. There is also a statue by S. W. Edwards of Frederick Douglass, the negro editor and orator, who lived in Rochester from 1847 to 1870 and is buried in Mt. Hope cemetery.

Public Buildings. Among the noteworthy buildings are the courthouse, city hall, Federal Building, Convention Hall, Chamber of Commerce, state armory, Y. M. C. A. Building, the Masonic, the Powers, the Sibley, the German-American, the Duffy-Powers and the Buffalo, Rochester & Pittsburgh office buildings; the Rochester, Seneca, Eggleston, Powers, Whitcomb, Clinton, Osburn and Bristol hotels; six theaters, about 15 banks, substantial business blocks and about 132 churches, many of them of beautiful architecture. Rochester is the seat of a see of the Roman Catholic Church.

Institutions. The leading educational institutions include the University of Rochester (Baptist), with which is connected the Ward Museum; the Rochester Theological Seminary; St. Bernard's Seminary (Catholic); Wagner Lutheran College; Academy of the Sacred Heart (Catholic); and the Athenæum and Mechanics' Institute, with an endowment of $650,000. This institution was founded in 1885 by Henry Lomb of the Bausch & Lomb Optical Company, and has a large building, the gift of George Eastman of the Eastman Kodak Company. The libraries include the Reynolds and law libraries. Rochester is the seat of the Western New York Institution for Deaf-Mutes, Monroe County Penitentiary and a New York State Hospital for the Insane. Other institutions include the Protestant Episcopal Church Home, the City, Municipal, Hahnemann and St. Mary's hospitals, an old ladies' home and many private charities.

Industries. Rochester is primarily a manufacturing city and has varied industries. In the manufacture of optical goods and photographic apparatus the city holds first place in the world. The clothing industry ranks high and there are extensive manufactories of boots and shoes, furniture, electrical machinery, telephone apparatus, railway signals, paper and wood boxes, filing cabinets, wagons and carriages, confectionery, tobacco, buttons, meteorological instruments, petroleum products, glass, enameled tanks, caskets, lamps and soda-fountain sirups. The flour-milling industry was first of great importance in the history of Rochester. There are a large number of nurseries in and about the city representing several millions of dollars. The annual shipment of bulbs, seeds and plants exceeds about $2,000,000.

History. The site of Rochester was the home of the Seneca Indians when the place was first visited by the French who established a French post on Irondequoit Bay in 1710. Ebenezer Allen built a gristmill in 1790 on the present site of the city, and a settlement rapidly grew up. In 1802 a tract of land, which included the city's site, passed into the hands of William Fitzhugh, Charles Carroll and Nathaniel Rochester, all of Maryland. The town was first called Rochesterville in honor of Nathaniel Rochester, but the name was abbreviated to Rochester in 1819. The opening of the Erie Canal gave an impetus to trade and the first city charter was granted in 1834. Population in 1920, 295,850.

Rock'efel"ler, John Davison (1839-), an American capitalist and founder of the Standard Oil Company, born in Richford, N. Y. At sixteen he began his business career as a clerk. At nineteen, with $1000 he had saved and $1000 borrowed from his father, he engaged in the produce commission business. In 1862 he took in partnership with others Samuel Andrews, an expert refiner, and began in the oil refining business. In 1865 Mr. Rockefeller bought out the interests of his partners, and associated himself in the oil refining business with Samuel Andrews, under the style of Rockefeller & Andrews.

Mr. Rockefeller, in 1866, joined his brother William and Mr. Andrews and formed the firm of William Rockefeller & Company. All interests, in 1870, were merged into a corporation under the title of the Standard Oil Company of Ohio, with a capital of $1,000,000. This soon was increased to $2,500,000.

This capital was increased in 1873 to $3,500,000 to include other refining concerns, which properties were all merged in the Standard Oil Trust, in 1882. This was dissolved in 1892 and in after years continued under the title of the Standard Oil Company of New Jersey.

Mr. Rockefeller has been often described as the wealthiest man in the world, but the amount of his income has never been published. He is a staunch member of the Baptist Church. His benefactions for educational, philanthropic, scientific and religious purposes have been extensive. He founded the University of Chicago, to which he gave $32,000,000 in securities. He gave

$43,000,000 to the General Education Board. He has given more than $20,000,000 to the Rockefeller Institute for Medical Research, in addition to $175,000,000 to the Rockefeller Foundation and the Laura Spelman Rockefeller Memorial, for religious, educational and philanthropic work, besides numerous gifts to many other causes extending over a period of more than sixty years and amounting, all told, to more than $350,000,000.

The Rockefeller Institute for Medical Research was founded in 1901 in New York to conduct, assist, and encourage investigations in hygiene, medicine and surgery, and allied subjects; in the nature and causes of disease and the methods of its prevention and treatment; and to make knowledge relating to these subjects available for the protection of the public health and the treatment of disease and injury. The Institute has been generously endowed by Mr. John D. Rockefeller by a series of gifts which have from time to time capitalized its growing needs. In its laboratories in New York, researches are pursued in pathology, bateriology, physiology, chemistry, experimental biology, and experimental surgery. It maintains in New York a hospital for the study of such diseases as may from time to time be selected as promising fields for clinical research in the nature and character of the diseases and methods of improved treatment. Near Princeton, N. J., a Department of Animal Pathology has been established in which diseases of animals are studied which are of great economic importance and significance for the light which they may throw upon the problems of human diseases.

The Rockefeller Foundation was chartered by the New York Legislature in 1913 "for the promotion of the well-being of mankind throughout the world." While the chartered purposes are thus broad, the programs which the Foundation has developed have centered largely about public health and medical education.

In the field of public health it has carried on campaigns and demonstrations in the control of certain diseases, particularly hookworm, malaria and yellow fever. The hookworm and malaria demonstrations have been made with a view to showing the efficacy of sanitation and public health measures generally. The campaign against yellow fever aims at the complete elimination of that disease. In 1917 a special effort for the prevention of tuberculosis in France was added to the public health program. Public health work has been carried out in 12 states of the United States and in 25 foreign countries.

In medical education contributions have been made to strengthen strategic medical centers in America, to establish and maintain a School of Hygiene and Public Health at Johns Hopkins University and to aid on an extensive scale the introduction of modern scientific medicine into China.

During the War, much of the Foundation's attention and a large part of its resources were devoted to war relief and to medical war work and the welfare of American troops. Expenditures amounting to approximately $22,500,000 (including disbursement of a part of the Principal) were made for war work during the years 1914-1919 inclusive.

The general funds of the Foundation, representing a number of gifts by Mr. John D. Rockefeller, amount to $120,000,000.

The following is a summary of expenditures by the Rockefeller Foundation for all work during 1918: War Work, $11,107,874; Public Health, $1,255,990; Medical Education and Research, $2,419,866; Miscellaneous Appropriations, $128,312; Administration, $140,808. Total, $15,052,760.

Rock'ford, Ill., a city and county seat of Winnebago Co., 85 m. n.w. of Chicago, on the Rock River and on the Illinois Central, the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & Gary and other railroads. There is excellent street-

car service, and interurban electric lines connect the city with Chicago, Freeport, Aurora, Joliet and Elgin; Janesville and Beloit, Wis.; and other towns and cities. Rockford is built on both sides of the river, which is crossed by a number of railroad and highway bridges. A dam about 800 ft. long across the river secures excellent water power for manufacturing purposes, with a power rate equal to that in force in the Niagara Falls district. The city is surrounded by a fertile agricultural region and is one of the most important industrial centers of northern Illinois. The city covers an area of over eight square miles and contains broad, shaded streets, which are well laid out. There are many handsome residences and suburban homes surrounded by well-kept lawns and gardens. There is an extensive park and modern playground system. Among the public buildings are the Soldiers' Memorial Hall, courthouse, city hall, substantial business blocks, the Velie Museum of natural history, a number of banks and many handsome churches. Rockford is the seat of a Catholic see.

The leading educational institution is Rockford College (nonsectarian), for the higher education of women, founded in 1849 as Rockford Seminary. Other educational institutions include a high school, public and parochial schools, a business college and a Carnegie library. Among the benevolent and charitable institutions are the city and St. Anthony's hospitals. The Ransom Sanitarium is located in the north part of the city and the Broughton Sanitarium at the city limits on the south.

Rockford is the second industrial city in the state and has extensive manufacturing industries, which are represented by nut and bolt works, foundries and machine shops, paper and woolen mills, agricultural-implement works, furniture factories, saddlery and harness shops, flour mills and manufactories of silver-plated ware, hosiery and knit goods, sewing machines, watches, barb wire, stoves, pianos, clothing, pumps, grape sugar, machinery and other products. Rockford is also an important shipping point for agricultural and dairy products.

The first settlement was made in 1834 and the place was the first point settled in Winnebago County. A city charter was granted in 1852. The area of the city was greatly enlarged by the annexation of suburbs in 1890. Population in 1920, U. S. census, 65,651.

Rock'ing Stone. Sometimes huge blocks of stone occur in nature so perfectly balanced upon a point of rock that a slight force applied to them will cause them to tilt from side to side. Occasionally a large rock having a rounded base and nicely poised upon a flat surface can easily be set in motion like a cradle. Rocking stones are the result of natural agencies, such as wind and water; but some of those having the curved base have been artificially shaped. Some of the most widely known rocking stones are Logan Rock near Land's End, England, weighing from 70 to 90 tons, and that of Tandil, Argentine Republic, which is the largest in the world.

Rock Island, Ill., a city and the county seat of Rock Island Co., on the Mississippi River at the mouth of Rock River, adjoining Moline and opposite Davenport, Ia., with which it is connected by highway and railroad bridges, and on the Hennepin Canal. Railroads entering the city are the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & St. Paul and others. Rock Island is an important railway center and has extensive commercial and manufacturing interests. Between the city and the Island of Rock Island in the middle of the river a dam has been constructed by the Federal Government, which supplies abundant water power. The channel on the other (Iowa) side of the island is navigable. The chief manufactured products of the town are brick, lumber, glass, sash, doors, blinds, flour, stoves, oilcloth, carriages, wagons, soap and agricultural implements.

Rock Island is the seat of Augustana College and Theological Seminary (Lutheran), founded in Chicago in 1860, removed to Paxton in 1863 and to Rock Island in 1875. It contains a number of important buildings and a public library. The principal offices of the Modern Woodmen of the World, a large fraternal organization, are located here.

The Island of Rock Island contains a Federal arsenal for the manufacture of small arms and artillery equipment, and a Federal armory which cost $10,000,000; also a National cemetery. A point of interest is "Black Hawk's Watch Tower," a high bluff close by the city, named for the celebrated chief of the Sac Indians, who once inhabited these parts. The first white settlement was made on the island in 1816, when the United States Government built Ft. Armstrong. Here a treaty of peace was signed by Gen. Winfield Scott and Gov. John Reynolds and by chiefs of the Sac and Fox tribes at the close of the Black Hawk War. In 1841 Rock Island was formed by the consolidation of the settlements Farnhamsburg and Stephenson, and in 1849 received its charter. Population in 1920, 35,177.

Rock'land, Me., port of entry and county seat of Knox Co., 35 m. s.e. of Augusta, 86 m. from Portland and 10 m. from the Atlantic Ocean, on the Maine Central Railroad. Steamers ply between this place and Boston, Bangor, Bar Harbor and other points on the coast. The harbor is an easterly extension of Penobscot Bay and is accessible and commodious. Excellent shipping facilities contribute to Rockland's importance as a commercial center. Shipbuilding has been for many years an important industry. There are also extensive lime-burning works and granite quarries. Steam and gasoline engines, blacksmiths' and granite-workers' tools, brass goods and ax handles are among the chief manufactures. Fishing is carried on to some extent. Clams and sardines are canned and there are large lobster shipments. The town was originally a part of Thomaston and separately incorporated in 1848 as East Thomaston. The name was changed to Rockland in 1850, and it received a city charter in 1854. Population in 1920, 8109.

Rock River, a river of the United States. It rises in the southern part of Wisconsin, flows southwestward across Illinois and enters the Mississippi 3 m. below Rock Island. It is about 325 m. long and flows through a beautiful and fertile region. It is not important as a waterway.

Rock'ville, Conn., a city of Tolland Co., 16 m. n.e. of Hartford, on the Hockanum River and on the New York, New Haven & Hartford Railroad. The city is supplied with excellent water power, as the river has here a series of falls which descend 280 ft. The manufacturing establishments include silk, woolen, knitting and cotton mills, gingham and satinet factories and paper and envelope factories. Electric railways extend to Hartford and other towns and cities. Rockville was settled about 1726 by a colony from East Windsor and was a part of the town of Vernon. It was granted a city charter in 1889. Population in 1920, U. S. census, 7726.

Rocky Mount, N. C., a city of Edgecombe Co., 41 m. n. of Goldsboro and 121 m. s. of Richmond, Va., near the Tar River, and on the Atlantic Coast Line and other railroads. It is the commercial center of the surrounding region and has several manufacturing plants, among them lumber and cotton mills, cottonseed-oil mills, fertilizer factories, plants for the preparing of tobacco for market, and manufactories of yarns and machinery. An important institution of the city is the University School. Population in 1920, U. S. census, 12,742.

Rocky Mountain Goat, a North American member of the Goat-Antelope Family, found at high altitudes in the mountains of Montana and north. It is a slow, heavy animal with soft, white fur and large, black-hoofed limbs. The horns, which are short, sharp-pointed and slender, curve backward and are also black in color. Like all wild goats the Rocky Mountain goats travel in

herds, and they often surprise the hunter by the great curiosity which they show in regard to their pursuer. This antelope (it is really more of an antelope than goat), is not as sure-footed as many of its kin, but is protected by its hardiness from injury in falling. See GOAT.

Rocky Mountains, the largest mountain system of North America and the main axis of the continent. The system extends along the west side of the continent from the southern part of Central America to near the Arctic Ocean. In Mexico the mountains are known as the Cordilleras, and the name *Cordilleran* is sometimes applied to the entire system. The Rocky Mountain system includes all the ranges and intervening valleys and plateaus west of the Great Central Plain in the United States and Canada, as well as the mountain ranges of Mexico. The entire length of the system exceeds 4000 m., and its breadth varies from 400 to 1000 m.

In the narrower sense and the one in which the name is generally used in the United States, it includes only those ranges rising from the western border of the Great Central Plain and forming the eastern boundary of the great plateau. The mountains included in these ranges are often called the Rocky Mountains Proper in the United States, and the Canadian Rockies in Canada.

Within the United States the Rocky Mountains comprise a number of ranges, each of which has its special name. In Wyoming is a broad plateau extending east and west, known as the Laramie Plains. This plateau divides these ranges into two groups, the Northern Rockies and the Southern Rockies. The important ranges in the northern group are the Big Horn, in western Wyoming; the Bitter Root, forming a portion of the boundary between Idaho and Montana; the Cœur d'Alene, in western Montana; the Tetons, south of Yellowstone National Park; the Wind River, in western Wyoming; and a number of minor ranges.

In the southern group is the Front Range in Colorado; bordering on the Great Central Plain, south of this, are the Saguache, Elk, San Juan and Sangre de Cristo ranges. To the west are the Wasatch, in Utah; the Uintah, in southwestern Wyoming and northeastern Utah; and a number of smaller ranges. These are all grouped together under the name of Park Mountains.

The Park Mountains are noted for the large number of magnificent peaks found in their ranges. It is estimated that in Colorado alone there are 100 peaks having an altitude of 13,000 ft. or over (See COLORADO, subheads, *Surface, Scenery*), and the Wasatch range contains peaks of 12,000 ft.

To the southwest of the Park Mountains is a series of high plateaus extending into New Mexico and Arizona. The ranges also enclose four large tracts of level land known respectively as San Luis Park, South Park, Middle Park and North Park. Many of the rivers have worn deep channels with perpendicular walls in these plateaus forming canyons of wonderful beauty and grandeur (See COLORADO, GRAND CANYON OF THE; ROYAL GORGE). Notwithstanding their great altitude, from 7000 to 10,000 ft., the surrounding mountains give these plateaus the appearance of low land.

Throughout the system the loftiest summits are crowned with perpetual snow, and in the northern group of ranges numerous glaciers are found. These increase in size and magnificence as one passes northward to the Canadian Rockies, where glaciers which have continued from the Glacial Period are still found. In the northwestern part of Montana the National Government has set apart Glacier National Park because of the large number of glaciers the region contains. See GLACIER NATIONAL PARK.

Wherever there is sufficient rainfall, the slopes of the Rocky Mountains are covered with forests to the tree line, but in other places they are bare. Everywhere they present sharp-ridged outlines, and their scenery is characterized, as a whole, by grandeur rather than beauty. They contain, however, many

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charming valleys. The Rocky Mountains are rich in minerals and contain untold wealth in gold, silver, copper and lead. Lignite is also found in some sections, but it has not been extensively mined.

Less is known of the Canadian Rockies, but so far as they have been explored they are found to resemble closely the ranges in the United States. Though not attaining as high altitudes, these mountains are in many places more imposing than those in the United States because they rise to a greater height from the plateau upon which they rest.

Roden'tia, or **Gnawers,** *Nau' erz,* a very familiar and widely distributed order of Mammals, distinguished by several marked characteristics. The members of the group are spine-covered or furry and live chiefly upon vegetable food, which, by most of them, is gathered by night and stored in cleverly constructed burrows. The arrangement of their teeth is a particular adaptation to their needs, for the incisors, of which there are generally two upper ones, are long and have their roots at the back of the jaw, from which they continue to grow as fast as worn off at the point. The outer, hard enamel wears more slowly than the inner, softer dentine, and so the edge is kept continually sharp. Thus Rodents are enabled to gnaw their way through hardest wood and open the protecting shells of nuts. Just back of these incisors is a furry growth designed to keep dust, sawdust and chips from getting into the throat. The Rodentia are very prolific and are not easily exterminated. Various Rodents are discussed under their respective titles. See SQUIRREL; CHIPMUNK; BEAVER; CAPYBARA; RAT.

Rodin, *Ro" dan',* **Auguste** (1840-1917), a celebrated French sculptor, a leader of the modern Naturalists. He was born in Paris and studied in the Petite École and with the sculptor Barye. After various vicissitudes he exhibited his *Age of Bronze,* which caused a sensation; and later, his powerfully realistic statue, *St. John Preaching.* Another important work is the bronze door of the Museum of Decorative Arts, covered with figures suggested by Dante's *Inferno* and called "the door of Hell." His *Bourgeois of Calais,* a work of intense naturalism and dramatic force, is one of the great achievements of modern sculpture, in which the genius of Rodin reaches its culmination. Of considerable interest also are his numerous portraits and busts and the statues, *The Kiss, Francesca da Rimini, The Thinker* and *The Sphinx.*

Rod'man, Thomas Jefferson (1815-1871), an American soldier, born in Salem, Ind. He graduated from West Point in 1841, entered the ordnance department of the army, was brevetted brigadier-general in 1865 and was promoted lieutenant-colonel in the United States army two years later. He is best known for his invention of the Rodman gun and for his aid in the manufacture of ordnance and projectiles.

Roe, Edward Payson (1838-1888), an American clergyman and novelist, born in Moodna, N. Y. He studied at Williams College and at Auburn and Union seminaries and served as chaplain in the volunteer service from 1862 to 1865. After taking charge of the congregation of the Presbyterian Church at Highland Falls, N. Y., he retired in 1874 and devoted himself to literary work, lecturing and fruit culture. His earliest novel, *Barriers Burned Away,* a story of the Chicago fire, was followed by a long series of works which enjoyed great popularity. Among them are *Opening of a Chestnut Burr, From Jest to Earnest, Near to Nature's Heart, A Knight of the Nineteenth Century, A Face Illumined, A Day of Fate, His Somber Rivals, A Young Girl's Wooing, An Original Belle, Driven Back to Eden, He Fell in Love with His Wife* and *The Earth Trembled.*

Roebling, *Robe' ling,* **Washington Augustus (1837-1912),** an American engineer, born at Saxonburg, Pa. He joined his father in constructing the Pittsburgh Suspension Bridge across the Allegheny River, served in the Union

army, again aided his father in building the Cincinnati and Covington Suspension Bridge and alone superintended the entire construction of the Brooklyn Bridge. Mr. Roebling, who was president and director of the John A. Roebling's Sons Company, manufacturers of iron and steel wire and wire rope, Trenton, N. J., lost his life at the sinking of the *Titanic,* in the North Atlantic Ocean, Apr. 15, 1912.

Roe'buck", Roe Deer or **Roe,** one of the smallest members of the Deer Family. It is found in European countries, especially Scotland, England and the region east of the Alps. It is a graceful animal with three-pronged antlers and mild, beautiful eyes. The limbs are slender and agile. In color the roebuck is a soft brown, with a white patch upon the rump; in winter the coat is lighter and thus less noticeable against the snow. The fawn is dappled with light spots. Contrary to general custom, the names roebuck, roe deer and roe are applied to either sex.

Roentgen, *Runt' gen,* **Ray.** See X RAY.

Rogers, *Roj' erz,* **Henry Wade** (1853-), an American lawyer and educator, born in Holland Patent, N. Y., and educated at the University of Michigan. Admitted to the bar in 1877, he became a member of the law faculty and, in 1885, dean of the Law School of the University of Michigan, where he remained until he became president of Northwestern University in 1890. In 1900 he became associated with the Yale Law School, where he was made dean in 1903. His writings include *Illinois Citations, Expert Testimony* and *Introduction to Constitutional History as Seen in American Law.*

Rogers, John (1829-1904), an American sculptor, born at Salem, Mass. He studied for about a year in Rome and Paris, and, returning to America, began to produce groups of small figures representing incidents of home life and familiar scenes well known to the masses; and these became widely popular by reason of the human interest and sentiment which characterized them. Several life-sized statues, including one of Gen. John F. Reynolds and another of Lincoln, were executed by him.

Rogers, Randolph (1825-1892), an American sculptor, born at Waterloo, N. Y. At the age of 21 he went to Rome, where he spent several years studying with Lorenzo Bartolini and other sculptors. He then returned to New York, where his statues, *Nydia, the Blind Girl of Pompeii* and a *Boy with a Dog* attracted attention. In 1855 he returned to Italy where he continued to reside. Rogers is known for several colossal statues, among them the bronze statue of Lincoln, in Philadelphia, and the *Genius of Connecticut,* in the Connecticut Capitol at Hartford. He made the bronze doors for the new addition of the Capitol at Washington, the statue of John Adams in Mt. Auburn cemetery, and the figures of Marshall, Mason and Nelson for the Washington Monument in Richmond, Va. He also worked on many memorial monuments for American cities. He presented Michigan University with models of all his works.

Rohlfs, *Rolfes,* **Anna Katharine Green** (1846-), an American novelist born in Brooklyn, N. Y. Her first novel, *The Leavenworth Case,* reveals a clear knowledge of criminal law and marked powers of construction of plot. She has written *A Strange Disappearance, The Sword of Damocles, The Mill Mystery, The Forsaken Inn, The Woman in the Alcove, Three Thousand Dollars* and *The House of the Whispering Pines.*

Roland, *Ro" lahn',* **Manon Jeanne Philipon** (1754-1793), a famous society leader of the French Revolution era, born in Paris. She was the wife of the statesman Jean Marie Roland de la Platière, with whose political career she was closely associated. During the Revolution her home was frequented by prominent Girondist leaders, and after the fall of the Girondists she continued to support their cause. Arrested in June, 1793, Madame Roland was tried before the Revolutionary Tribunal and was exe-

cuted in November. As she was led to the execution, she bowed before the clay statue of *Liberty* erected in the Place de la Révolution and uttered the famous words: "O Liberty! what crimes are committed in thy name." Besides a number of remarkable political papers, she wrote her *Mémoires*. See GIRONDISTS.

Rolfe, *Rolf,* **John** (1585-1622), an early English colonist in America. Arriving in 1610, he was the first Englishman to raise tobacco in Virginia, which occurred in 1612. Later he married the Indian princess, Pocahontas, whom he took to England in 1616. On her death he returned to Virginia, where he took an active part in public affairs. See POCAHONTAS.

Rolfe, William James (1827-1910), an American Shakespearean scholar, born in Newburyport, Mass. He was the editor of the *Popular Science News,* and had charge of the Shakespearean departments of *The Critic* and *The Literary World.* He contributed freely to the leading periodicals and began his Shakespearean work with an edition of Craik's *English of Shakespeare.* His complete edition of Shakespeare's works appeared in 40 volumes from 1870 to 1883. He edited selected works of Tennyson, Browning, Mrs. Browning, Goldsmith, Gray, Scott, Macaulay, Byron, Milton and Wordsworth. Among his works are *The Elementary Study of English, Shakespeare the Boy, Life of Shakespeare* (1901), *Life of William Shakespeare* (1904) and *A Satchel Guide to Europe.*

Rolling, *Ro' ling,* **Mill,** a machine for shaping metal into rods, rails, beams, plates and other forms by means of rollers. Wrought iron, steel, copper and brass, as well as other metals and alloys, may be fabricated into shape by being passed between rolls. Usually the metal is rolled while hot, but sometimes it is desirable to roll it cold in order that it may become harder. The rolls are generally of cast iron, with a hardened surface, obtained by being cast in a metal mold called a chill. These rolls are made in various forms according to the shape of the article to be produced. Rolls for making plates have smooth, plain surfaces, but for rails and other forms they are grooved in a suitable manner to form the desired shape when the metal is passed through them. The metal passes through several sets of rolls before the form is finished, as seen in the process of making rails.

In the manufacture of rails, molten iron is run from the blast furnace into ladles holding about 12 tons each and mounted on a four-wheeled truck. These ladles are then hauled to a larger vessel holding about 150 tons and called the mixer, into which their contents are poured. The contents of other ladles from different blast furnaces are also poured into the mixer, which is revolved by hydraulic power, thoroughly mixing the contents from the different furnaces, thus producing an iron of great uniformity of chemical composition and temperature. When mixed, the metal is placed in small quantities in Bessemer converters and converted into Bessemer steel. As it is poured from the converter, this steel is cast into ingots weighing about 5000 lb. each. These ingots are then placed by electric cranes in a "soaking pit," 10 to 12 in a pit. Here they solidify and are given a uniform temperature throughout by being heated with gas or oil. The ingots are then hoisted from the pit and placed on the first mill for rolling, where they are reduced to "blooms," then to bars 8 inches square and 24 ft. long. The bar is then cut into sections, each of which will make three 30-foot rails. These sections are then passed successively through sets of rollers, cut and rolled again until the rail is completed. The ingot is reduced to a bloom in nine passes through the rolls, and the bloom to a rail in 13 passes, making 22 in all. The rails are cut when hot into 30-foot lengths and placed on beds to cool. See BLAST FURNACE; BESSEMER CONVERTER; IRON AND STEEL.

Ro'man Cath'olic Church, a Church which comprises those baptized Christians who accept the pope as vicar of

Christ, successor to St. Peter and visible head of the Church. It claims for each pope extraordinary power transmitted from St. Peter, to whom Christ spoke the words: "Thou art Peter, and upon this rock I will build my church. Feed my lambs. Feed my sheep." The Catholic Church professes to have kept unchanged the dogmas, morals and sacraments received from Christ. Consequently, she claims infallibility on matters of religious doctrine. Her bishops claim authority through the apostles, to teach all nations to the end of time. Her priests, in turn, are empowered by the bishops.

The chief doctrines are expressed in the Apostles' Creed, which is amplified in the Nicene Creed, the Creed of Constantinople and the Athanasian Creed. Her public worship is regulated in *The Catholic Liturgy,* the three most important forms being prayer, the sacraments and, above all, the mass. The two prayers most frequently recited are the Lord's Prayer and the Angelical Salutation, or Hail Mary. The seven sacraments of the Catholic Church, claimed to have been instituted by Christ, are:

1. Baptism—washes away original sin. In adults it effaces sins committed before baptism.

2. Confirmation—fills the soul with the perfecting graces of the Holy Ghost.

3. Communion — the reception of Christ's body and blood. Catholics believe that when the priest says, "This is my body, this is my blood," our Lord becomes, by transubstantiation, really and truly present.

4. Confession—Catholics claim for their ministers the power of forgiving sins because Christ said to the apostles, "Receive ye the Holy Ghost: whose sins you shall forgive, they are forgiven them, and whose sins you shall retain, they are retained." Confession is made to the priest, who is vowed to secrecy.

5. Extreme Unction—Gives the dying spiritual and bodily assistance.

6. Holy Orders—Admit the worthy into the service of Christ, vowing them to piety, obedience and celibacy.

7. Matrimony—Indissoluble where no nullifying condition existed from the beginning.

The mass, a commemoration of the sacrifice of Christ's body and blood, is performed on a consecrated stone called the altar. It is offered for both living and dead. It is the supreme prayer of the Church.

The six chief commandments of the Catholic Church are:

(1) to hear mass on Sunday and holy days of obligation;

(2) to fast and abstain on appointed days;

(3) to make at least annual confession;

(4) to receive communion during Easter time;

(5) to contribute to the support of pastors;

(6) not to marry kindred within the fourth degree, clandestinely or at forbidden times.

Catholics believe in purgatory and in limbo, a place of peace for unbaptized infant souls.

The Catholic Church accords a special degree of honor to the Blessed Virgin. It believes in her immaculate conception, her absolute sanctity and virginity, and her assumption into Heaven. Prayers are addressed to her, whose intercession is all powerful. In her honor the scapular is worn, and the rosary is recited (See MARY, THE VIRGIN; ROSARY). All the canonized saints are highly honored by Catholics, but they are not adored. The saints may intercede; not grant favors. Relics and images are likewise venerated. The cross is sacred as a symbol distinctively Christian and commemorating the death of Christ.

The ecclesiastical year is divided into six parts: Advent, Christmastide, Septuagesima, Lent, Paschal Season and Pentecost. Many days of special observance occur during the year. Besides Christmas, the Circumcision and Easter, the Catholic Church fittingly observes Candlemas, Ash Wednesday, Passion Sunday, Palm Sunday, Holy Thursday, Holy Saturday, Good Friday, Ascension

Day, Trinity Sunday, Corpus Christi, the Annunciation, All-Saints' Day, All-Souls' Day and the Ember days.

Romance, *Ro mans'*, Languages. See LANGUAGE.

Roman Literature. See LITERATURE, subhead *Roman Literature.*

Romans, Epistle to the. See PAULINE EPISTLES.

Romanticism, *Ro man' ti siz'm.* The fusion of that form of the Latin which was spoken by the common people of Italy, with the native language of the invading barbarians, formed what are known as the Romance languages, and from this name the term *romanticism* is derived. The most conspicuous literary expression of the Romance speech occurred in the 11th and 12th centuries in southern France, where were composed and sung tales of gallant knights, fired by the spirit of love, loyalty and religious zeal. This literature was characterized by a fondness for the mysterious and supernatural, and in time the word *romance* was used to refer to the character of the productions of the Romance language as well as to the language itself, and, furthermore, in contrast to the term *classical* as applied to the Latin works. Throughout the 18th century, European literature was dominated by classical ideals, but in the closing years of that century a change made itself felt in all forms of thought, which culminated in a 19th-century movement to which the name Romantic has been given.

The Romantic movement, which manifested itself in an entire change of attitude in philosophy, history, science, art and literature, denounced the formal and mechanical imitation of classical models and ideas and declared it to be the privilege of the individual to express his aspirations without restraint. Where Classicism is direct, objective and definite, Romanticism is suggestive, subjective and idealistic. Romanticism professés a love for the strange and mysterious and a sympathetic feeling for the chivalric spirit of the Middle Ages. The Classicists believed that art should be guided by fixed and precise rules; the Romanticists declared that art was the spontaneous expression of the spirit within. This was a step toward realism, dominant in present-day literature.

The Romantic movement in literature had a marked influence on the writings produced in the 19th century in England, Germany and France. In England, Gray, Cowper and Burns were forerunners of the movement which had its complete expression in Wordsworth, Coleridge, Southey, Byron, Shelley and Keats. The student of this movement should read Wordsworth's explanation of his poetic theories, to be found in the *Preface* to the *Lyrical Ballads.* In Germany, Lessing, Herder and Goethe were imbued with the Romantic spirit, but the name Romantic School is usually applied to a group of men consisting of the brothers Schlegel, Schelling, Novalis, Tieck and Schleiermacher, whose work was mainly along philosophical and æsthetic lines. In France, Chateaubriand and Madame de Staël were forerunners of the movement, the greatest exponent of which was Victor Hugo. See LITERATURE, subhead *English Literature, Period of Romanticism.*

Rome, the present capital of Italy, famous as the capital of the old Roman Empire and of the spiritual kingdom of the popes. The city is situated about 15 m. from the Mediterranean upon the turbid Tiber, the largest river of the peninsula, which flows through the city cutting it in three wide curves. In or near the city the river is spanned by 12 bridges, many of historic interest. The Tiber, which is now running through an artificial channel, is of slight importance commercially. Rome lies chiefly in a level plain upon the left bank of the Tiber, but also extends up the slopes of the seven hills still crowned with the ruins of temples and shrines interspersed now with gardens, orchards and modern homes. The Rome of today must not be confused with the ancient city, and viewed as a place chiefly of historical interest. Since 1871, when it became the capital of Italy, it has taken its place

among the capitals of Europe as a vigorous growing city, rendered sanitary by modern skill and emancipated from its lethargy by the faith and zeal of Vittorio Emmanuele (Victor Emmanuel II). For this reason the Forum, the Colosseum and the Capitol may well be forced into the background by the great monument to Vittorio which dominates the city and typifies the new spirit of Rome. In many places the streets are still narrow and irregular, and a congested residence district occupies the heart of the city, but rapid improvement has been made in the last few years, especially through the efforts of the Roman Association of Good Building, which is constructing model tenements for the poor.

The ancient wall of Rome, pierced by its 13 gateways, still stretches for ten miles along the Tiber, and where once the Via Flaminia passed to the northeast is the Piazza del Popolo. This square is the terminus of the Corso Umberto Primo, the most fashionable drive of the city. Other thoroughfares of almost equal importance traverse the city, which is further made attractive by frequent open squares. The Piazza Colonna, with its famous column of Marcus Aurelius, is among the most popular of these. Many of the parks that occupy sites familiar through history are better known to students through their historical rather than their modern names.

The most notable structures of Rome, aside from its ruins (See ROME, ANCIENT) are its palaces and churches. The Cathedral of St. Peter is the largest and richest in the world. It stands facing the Piazza di San Pietro, whose curving colonnades form a suitable approach to the great edifice (See SAINT PETER'S CHURCH). In the center of the Piazza stands the obelisk brought from Heliopolis. The Church of St. John Lateran in the southeast part of the city is famous because of its age and because it was the home of the Lateran Councils. Probably the most famous of all buildings is the Vatican, the residence of the popes (See VATICAN). Its vastness, its famous library, its treasures of art, its historical interest and its religious significance make it one of the greatest buildings in the world.

Among the other palaces of Rome are the Quirinal (the present residence of the king), the Borghese, the Rospigliosi and the Colonna, all noted for their treasures of art. The Capitoline Museum on the old Capitoline Hill is famous for its fine collection of statuary. Rome abounds in educational institutions; the University of Rome ranks first among these and has faculties of law, medicine, philology and physical sciences. Other noteworthy institutions are the Collegio Romano and Collegio di Propaganda Fide, a missionary college. Of the small schools, though by no means the least well known, are the famous kindergarten schools of Madame Montessori which are revolutionizing educational methods for the children of Italy. See MONTESSORI METHOD.

The industries of Rome include the manufacture of silks, hats, gloves, musical instruments, jewelry, leather, velvet, furniture, glass, pottery and candles. The production of works of art occupies the attention of many people, and the care of the many tourists forms no small part of the source of income of the people. Population, 600,000.

Rome, Ancient. The ancient city of Rome was at the height of its splendor during the empire. The southern part of the modern city formed the site of the ancient city, which was built on seven hills on the River Tiber. The central hill was the Palatine; to the north of the Palatine lay the steep Capitoline; west and back from the river were the Quirinal, Viminal, Esquiline and Cælian hills; and the Aventine rose to the south. The city was surrounded by walls, and was made impressive and beautiful by splendid architectural structures, open spaces covered with grass and trees, and the places of public meetings. The Tiber was spanned by several bridges.

The famous Roman Forum occupied a valley which extended from the foot of the Capitoline to the northwestern

CATHOLIC DIVINES

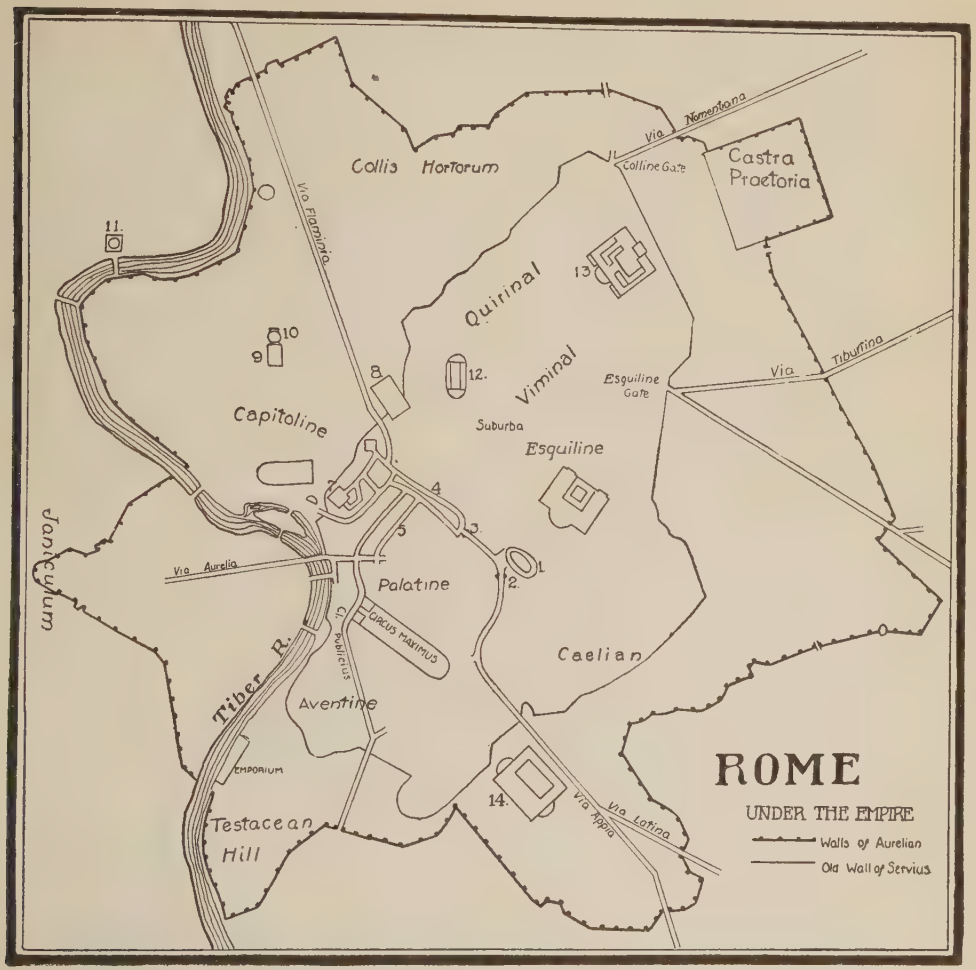
HADRIAN'S TOMB, ROME

This circular mass of masonry was built in 136 A. D.

SAINT PETER'S CHURCH, ROME

The largest Christian church in the world, dedicated in 1626. Its beauty reveals the genius of the greatest of its architects, Michelangelo.

part of the Palatine (See FORUM). Beginning with the Emperor Augustus, each of several later emperors constructed a Forum to cope with the expanding political-judicial life of the city, until the fourth century it had a most splendid appearance. Backing against the Capitol were the temples of Concord, of Vespasian and the Dii Consentes. The space between the ascent to the Capitol



1. Colosseum.—2. Arch of Constantine.—3. Arch of Titus.—4. Via Sacra.—5. Via Nova.—7. Temple of Jupiter Capitolinus.—8. Column of Trajan.—9. Baths of Agrippa.—10. Pantheon.—11. Mausoleum of Hadrian.—12. Baths of Constantine.—13. Baths of Diocletian.—14. Baths of Caracalla.

there was a continuous line of these meeting places to the north and east of the Roman Forum. Of these, the Forum of Trajan was the most splendid. The decoration of the Roman Forum continued throughout the empire, and by and the Vicus Jugarius was occupied by the Temple of Saturn and the Arch of Tiberius, which faced the Arch of Septimius Severus, with the Rostra between them. Beyond the Arch of Severus, on the north, were the Senate House and

other political buildings, the Temple of Janus and the Basilica Æmilia. On the south side were the great Basilica Julia and the Temple of Castor (Dioscuri), the latter a most beautiful specimen of Roman architecture. The center of the open space was occupied by the Temple of Julius, with a triumphal arch of Augustus near by.

The great central street of the city, the Via Sacra (Sacred Way), ran along the Forum by the Colosseum to the space between the Esquiline and Cælian hills. Toward the Colosseum rose the impressive arches of the Basilica of Constantine; to the southeast stood the Arch of Titus; and east of this arch was the magnificent Colosseum (See COLOSSEUM). The principal roads leading out of Rome were the Flaminian Way and the Appian Way.

Of the many famous temples of Rome, the oldest and most sacred was that of Jupiter Capitolinus, on the Capitoline Hill. The beautiful temple of all the gods, the Pantheon, was erected by Hadrian, 123 A. D., to replace an earlier structure built by Agrippa, son-in-law of Augustus, and was remodeled by later emperors. The Pantheon, in the Campus Martius, is the most perfectly preserved of the remains of Roman architecture. It consisted of a circular hall about 142 ft. in diameter, supporting a dome rising to a height of 142 ft. The only window in the structure was an opening in the summit of the dome, which had a diameter of 27 ft. The interior was adorned by seven niches for statues, and the inside walls were formed of splendid columns of yellow marble, with white capitals, supporting noble arches. Upon these arches rested more pillars and another row of arches—up to the base of the dome. Other famous temples were the Temple of Apollo, on the Palatine, the Temple of Minerva, the Temple of Peace and the Temple of Venus. The Circus Maximus, the noble palaces, the theaters, public baths and the tombs were other important and impressive features of the great city of the ancient Romans. See BATHS, ROMAN.

PEOPLE. Ancient Rome was formed by a mixture of peoples. It seems probable that at first it was an unimportant settlement of Latium, built on the Palatine Hill, the inhabitants of which called themselves Ramnes. Later a band of Sabines, called Tities, established themselves on the Quirinal; and, still later, the Luceres, either Latins or Etruscans, settled on the Cælian Hill. In the course of time the various settlements on the seven hills were united into one city.

Classes of Society. The "Roman People" at first included only members of the three tribes who settled on the Palatine, the Quirinal and the Cælian hills. These were called patricians, and they alone could vote, or hold office, or sue in the law courts. After a time dependents, called clients, flocked about the great patrician families. The client could hold property and engage in trade, but these rights must be secured by his patron lord, who represented him at law.

Sometimes all the conquered people of a district were transported to Rome and were under the absolute power of the king. These were called plebeians. Their number was increased by adventurers and merchants who flocked to Rome as she became a commercial center, and they became so important in the state that the clients tried to enter their ranks. At length there were virtually but two classes in Rome, the patricians and the plebeians.

The Family. The Roman family was like a little state with the father as absolute ruler. When a son married, his wife came under the father's rule, while his own daughter passed by marriage to the control of the head of another household. There was no appeal from the father's will, and by law he could sell or kill all under him. Public opinion and religious feeling were strong curbs to unjust indulgence of this arbitrary power.

Early Political Institutions. In Rome there were 300 clans, or *gentes*. These groups were based on blood relationship and were united into 30 curias. These curias were divisions for both worship and government. The earliest popular

assembly was an assembly by curias, the comitia.

At first the king stood as a Roman father to the State. The power of the curias was limited to giving approval to any change, but they met when called by the king, in order to hear his commands. The Senate, consisting of 300 members, became an advisory body with the right to veto any change. The king filled vacancies by appointment.

The plebeians made their way first into this patrician state by the reform of the army under King Servius Tullius. In his desire to increase the Roman army he enrolled all the men in it and assigned the position of each according to his income. There were five classes, each divided into centuries, or companies of 100 men each. The duty of fighting was associated with the privilege of voting, and soon this army of centuries was changed into an assembly called the comitia centuriata, which gained the governing powers of the comitia curiata. The government was still highly aristocratic, as each group in the new assembly had but one vote. The curiata remained only for religious exercises and for political matters of minor importance.

Religion. The Romans, like the Greeks, worshiped ancestors and the powers of nature, but their mythology was never so richly imaginative as that of Greece, and their deities were less like men than were those of the Greeks. The will of the gods was sought out by a study of omens; divine favor was lost or obtained according to the performance of various rites and ceremonies. There were two important colleges of priests: the pontiffs, six in number, who had general oversight of the whole system of religious law; and the augurs, also six in number, in whose possession lay the interpretation of the auspices, or omens. These auspices were sought especially in the conduct of birds and in the character of the entrails of animals. Each temple also had its special priests, most famous of whom were the Vestal Virgins. The Vestal Virgins kept the sacred fire alive and pure on the city hearth. On the whole, Roman religion had little of beauty or inspiration; it was chiefly a mechanical routine of ceremonies.

HISTORY

Only a general outline of the history of Rome is known up to about 390 B. C. Its legendary founder (753 B. C.) was Romulus (See ROMULUS). Six legendary kings followed him. Numa Pompilius, who succeeded him, gave laws and religious ceremonies; next came two conquerors, Tullus Hostilius and Ancus Martius; Tarquin the First came from Etruria, and was followed by Servius Tullius, who reorganized the State, enlarged the city and surrounded it with a wall. Then came the last king, Tarquin the Proud, who was driven from Rome in 510 B. C. and whose expulsion was followed by the establishment of a republic. About a century ago these legendary kings were considered as real as Julius Cæsar or Pericles, but the inconsistencies were exposed by critical scholars in the early 19th century. These stories, however, were believed by the Romans themselves, and they reveal the traits which the later Romans most admired.

THE REPUBLIC (510-44 B. C.). *Rise of the Plebeians.* The change in government following the expulsion of the kings worked against the plebeians. At the head of the government were two patrician consuls, who shared the kingly power. The plebeians had practically no share in the government, and, moreover, the patricians used their power to oppress them, especially in the matter of laws regarding debts. Finally, in 493 B. C., the plebeians seceded in a body to a hill three miles from Rome, just at a time when they were needed to help fight the Volscians. Forced to yield, the patricians granted the seceders the right to choose two tribunes each year, who were to possess the power of sharing the consular veto. In 462 B. C. the plebeians asked that the laws be written down, and after years of struggle they secured in 451 B. C. the appointment of a board of dictators, known as the Decemvirs,

who reduced the laws to writing. These laws, engraved on stone tables, were known as the "Laws of the Twelve Tables," and they formed the basis of later Roman law.

A second secession of the plebeians, in 449 B. C., was the result of the attempt of the patricians to abolish the tribuneship. An important effect of this revolt was the reorganization of the assembly of tribes, or comitia tributa, which became the most important of the popular assemblies. At this time it was made to consist of all patrician and plebeian landowners, each tribe voting as a unit. Four years later plebeians were granted the right to marry with patricians, and a social fusion began. The plebeians also continued to gain politically. In 367 B. C. the Licinian Rogations admitted them to the consulship. In 356 B. C. they secured the office of dictator; of censor in 351 B. C.; and of prætor in 337 B. C. Finally the Senate became plebeian, and by the year 300 B. C., politically there was no distinction between the two classes.

Conquest of Italy. From 500 to 390 B. C. the enemies of Rome threatened her very existence. In 390 B. C. the city was taken and burned by the Gauls. She rallied, however, and drove them beyond the Po. Between 326 and 290 B. C. Rome conquered the Samnites. This brought the Romans into contact with the Greeks in the southern part of Italy. The Greek cities were aided by Pyrrhus of Epirus. He was defeated at Beneventum in 275 B. C., and the cities soon gave up the contest. By 265 B. C. Rome had all Italy south of the Po under her control.

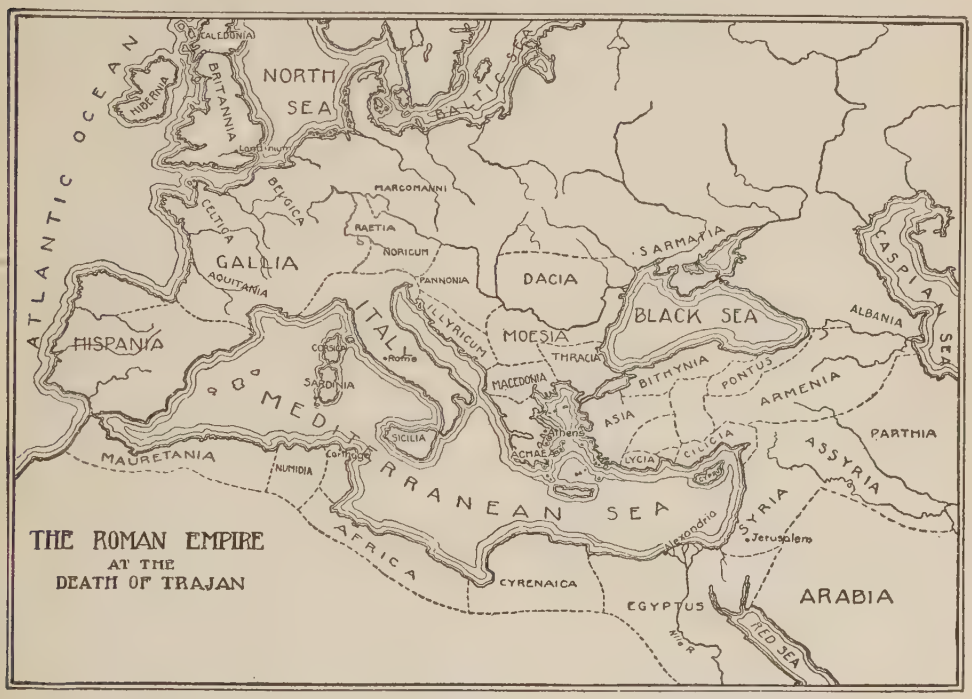
Struggle with Carthage (264-146 B. C.). Carthage was the commercial rival of Rome, and soon a bitter jealousy arose between the two states. The first struggle (264-241 B. C.) involved the possession of Sicily. The result was that Rome gained possession of the island and Carthage was humbled into paying a war indemnity. In the second struggle (218-202 B. C.) the Carthaginian leader, Hannibal, carried the war into Italy, and for a while Rome was in great danger (See HANNIBAL). After the Battle of Zama, Carthage gave up all her possessions, destroyed her fleet and promised to pay 250 talents yearly for 50 years, and become the ally of Rome (See PUNIC WARS). It is important to note here that during this struggle a strong, efficient government was necessary. The Senate stayed in the city and did noble work, but it absorbed the power of the government. It refused to give up the powers it had assumed during the time of peril and thus laid the foundation for the civil strife which followed.

Rome in the East (201-146 B. C.). In the next 50 years after the Second Punic War, Rome annexed all the territory belonging to Carthage and Macedonia and held Egypt and Syria as protectorates, and thus became the only great power in the world. These conquests brought Greek culture and a stream of wealth which was destined to change Roman life. The Roman farmer found himself growing poorer, as he could not compete with the farmers of the provinces. He was forced to sell his land to the great capitalists who organized vast estates and worked them with slaves. Driven to the city, the Roman found the same merciless, foreign competition there when he turned to industry and commerce. Gradually a restless population grew up which was hopelessly pauperized. The nobles seized the power, kept others out by making an entrance into political life so expensive that only the very rich could attempt it, and ruled for their own personal interests.

Period of Civil Strife (133-44 B. C.). An unsuccessful attempt at peaceful reform of these evils was made by the Gracchi (See GRACCHUS, CAIUS; GRACCHUS, TIBERIUS). These two noble patriots were slain. The Senate proved strong enough to block a reform according to law, but went down before the military leadership of Marius, and became the mere tool of its champion, Sulla (See MARIUS, CAIUS; SULLA, LUCIUS). Sulla's attempt to restore the rule of the Senate failed and his work was overthrown

by Pompey only ten years after his death.

The struggle of parties continued until Julius Cæsar mastered the situation by increasing the power of the chief magistrate and virtually changing the government to a monarchy. He made the Senate more democratic by increasing its membership. Cæsar was in the midst of far-reaching reforms when he was assassinated. See Cæsar, Caius Julius.



The Empire. *From Augustus to Diocletian* (31 B. C.-284 A. D.). After a few years of confusion following the death of Julius Cæsar, peace was restored by his nephew, Octavius, who organized the empire along the lines his uncle had marked out. Octavius, who was given the title of Augustus by the Senate, tried to establish a dual rule of chief magistrate and Senate, but he was forced to take more and more power to himself (See Augustus). For the next two centuries the forms of constitutional government were generally observed, and the provinces were well governed. During the reign of Tiberius (14-37 A. D.), successor of Augustus, Christ was crucified. Nero (54-68) carried out the first persecution of the Christians, and during his reign Rome was partly destroyed by fire. In 69 Jerusalem was besieged and destroyed by Titus, son of the Emperor Vespasian. During the reign of Titus (79-81) occurred the eruption of Mt. Vesuvius. Titus was followed by Domitian (81-96), a strong, stern ruler. In his reign Agricola completed the conquest of Britain. Then followed the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius.

In the reign of Trajan (98-117) occurred the greatest extent of the empire, and his reign is also famous for the construction of roads and other public works throughout the provinces. Hadrian (117-138) constructed a wall in Britain from the Solway to the Tyne, and withdrew the frontier to the Euphrates. His

rule was one of general organization. The chief feature of the rule of Antoninus Pius (138-161) was the legislation to prevent cruelty to slaves and to lessen suffering. Marcus Aurelius (161-180) was a philosopher of the Stoic School. His reign was marked by wars against the barbarians, and a cruel persecution of the Christians. The Emperor himself, however, was a kindly and just man.

After the death of Marcus Aurelius came a century of disputed succession between military adventurers, in which 27 "barrack emperors" were set up by the army. Nearly all of these were slain in revolts. Among these emperors were Caracalla (211-217) who made all free inhabitants of the empire citizens; Claudius (268-270), who coped successfully with the invading barbarians; and Aurelian (270-275), who put down internal rebellion.

From Diocletian to the Fall of Rome (284-476). In 284 Diocletian came to the throne. Himself a barrack emperor, the last and greatest of them, he ruled with a strong hand for 21 years. Toward the close of the reign occurred the most severe of the persecutions of the Christians. Diocletian is remembered chiefly for his reorganization of the system of government, whereby was introduced the plan of partnership emperors. Diocletian chose as a colleague Maximian, having the same title and dignity as himself—that of Imperator Cæsar Augustus. The two Augusti divided the empire, Diocletian taking the East, and Maximian the West. Then each intrusted half of his domain to the care of a chosen heir, with the title of Cæsar. The entire plan of government was thoroughly systematized, and the State became a centralized despotism (See Diocletian).

Diocletian and Maximian retired in 305, and the two Cæsars—Galerius in the East and Constantius in the West—became emperors. The death of Constantius, a few months later, was followed by eight years of civil strife among various claimants for the throne. In 312 Constantine, son of Constantius, established his right to occupy the throne in the West, and the next year Licinius became emperor of the East. Constantine became sole emperor in 324, and ruled as a farsighted and broad-minded statesman. His reign is marked by the removal of the capital of the empire to Byzantium, which he later renamed Constantinople; and by the establishment of Christianity as the most favored religion. The division of the empire under the sons of Constantine was followed by 13 years of strife, when Constantius became sole ruler. He was succeeded by Julian, who is known in history as the Apostate, because of his attempt to reestablish paganism (See Julian). On Julian's death in 363 one of his officers was chosen emperor.

A few months later Valentinian (364-375) came to the throne. He restored the system of partnership emperors, assigning the East to his brother Valens. In 376 Valens permitted the Goths to cross the Danube to become subjects of the empire. These barbarians rose in rebellion because of the deceit of imperial officials, and defeated Valens in the Battle of Adrianople, 378, where he was slain. Gratian, Emperor of the West, gave the throne to Theodosius (379-395), a strong and able ruler who succeeded also to the real authority in the West on the death of Gratian. Under Theodosius occurred the last real union of the whole empire under one ruler. In 395, on the death of Theodosius, the empire was divided between his sons, Arcadius and Honorius (See Byzantine Empire).

The empire was from now on much harassed by invading hordes of barbarians. The Goths under Alaric were defeated by the general of Honorius, but they later captured and sacked Rome. The legions had to be withdrawn from the provinces to protect Italy, and Roman rule in those regions rapidly declined. The Visigoths founded a kingdom in southern France and Spain, and the Vandals took possession of northern Africa. In 455 the Vandals under Gen-

seric captured and plundered Rome. The last Emperor of the West was a child, Romulus, surnamed Augustulus. In 476, Odoacer, a German officer in the imperial service, dethroned the child ruler and assumed the imperial authority.

Italy became a province of the Eastern Empire, and was ruled theoretically from Constantinople until the year 800. In that year Charlemagne was crowned Emperor of the West (See CHARLEMAGNE). As Charlemagne was combining the best in the Roman and Teutonic civilizations, the Eastern Empire with its seat of government at Constantinople was becoming more and more Oriental. Yet this empire performed a notable service to civilization by keeping Europe free from the inroads of Asiatic races, and by remaining the storehouse of the old Greek and Roman culture before the city fell before the conquering Turks in 1453.

For other details of Roman history, see MARK ANTONY; POMPEY; MITHRIDATES THE GREAT; CICERO, MARCUS TULLIUS; CATILINE; CRASSUS, MARCUS LICINIUS; CLEOPATRA; GOTHS; VANDALS; FRANKS. See also LITERATURE, subhead *Roman Literature;* ARCHITECTURE, subhead *Rome;* SCULPTURE, subhead *Rome;* MYTHOLOGY.

Rome, Ga., a city and the county seat of Floyd Co., 74 m. n.w. of Atlanta at the confluence of the Etowah and Oostanaula rivers, which here unite to form the Coosa. Among the railroads which enter the city are the Central of Georgia, the Western & Atlantic, the Southern and the Rome & Northern. The city is the center of one of the most productive sections of the state. Large crops of cotton and cereals are grown in the river valleys, and the elevated lands yield quantities of fruit and vegetables. An extensive trade in these products is carried on. Rome is rich in mineral resources; bauxite (a leading article of export), iron, limestone, coal, marble, slate, fire clay and cement rock are mined and quarried in the vicinity. It is of considerable importance industrially, with cotton mills, hosiery mills, foundries and machine shops, a tannery, stove works, planing mills, a large fruit nursery and manufactories of cottonseed oil, fertilizer, plows, scales, crates, boxes, furniture, lime, brick, mattresses, wrapping twine, trousers and other factory products.

Rome is the seat of Shorter College (for women), established in 1873 and later endowed by Col. Alfred Shorter, and of the Berry Industrial School, for mountain boys. Other features of interest are the county courthouse, the post office, Mobley Park and the several iron bridges across the rivers. The place was settled in 1834 and soon afterwards became the county seat; it was chartered as a city in 1847. In 1863 a Federal force of 1800 men under General Streight was captured here by General Forrest commanding 600 Confederates. Rome was for many years the home of the humorist Charles Henry Smith (Bill Arp). Population in 1920, 13,252.

Rome, N. Y., one of the county seats of Oneida Co., 15 m. n.w. of Utica, on the Mohawk River, at the junction of the Erie and Black River canals, and on the New York Central & Hudson River and the New York, Ontario & Western railroads. Rome is a fine residential city with broad and shaded streets. The Deaf-Mute Institute, State Custodian Asylum, Oneida County Home and St. Peter's Academy are located here. Rome is especially noted for its large output of butter and cheese. Its principal manufactures are electrical supplies, brass and copper goods, wire, canned and knit goods and brick. The Battle of Oriskany was fought near by on Aug. 6, 1777. On the site of Rome, Ft. Stanwix was built in 1758. It was chartered as a city in 1870. Population in 1920, 26,241.

Romney, *Rum' ny,* **George** (1734-1802), an English portrait painter, born at Dalton, Lancashire. After studies in England, Italy and France he resided in London, where he shared the popularity of Reynolds and Gainsborough, and painted the leading personages of his day. His beautiful model, Emma Hart, who afterward became Lady Hamilton,

he painted in a variety of impersonations. He was somewhat sentimental and showed great dexterity in making his subject beautiful without losing the likeness.

Rom'ulus, mythical founder of and first King of Rome, son of the Vestal Virgin Silvia, daughter of Numitor, King of Alba. By Mars she became the mother of Romulus and Remus. Amulius, who had usurped their grandfather's throne, left Romulus and his twin brother to drift on the Tiber. The basket containing the infants was stranded in the roots of a wild vine at the foot of the Palatine Hill, where Faustulus, herdsman of Amulius, found the boys after they had, for some time, been nourished by a she-wolf and a woodpecker. Taking them home, he reared them as his sons. When Romulus and Remus reached manhood, they went to Alba, where they learned of their parentage. In place of the usurping Amulius, they reinstated their grandfather, Numitor, as king, and with his consent then determined to build a city. Disagreeing as to the site, the brothers consulted the omens, which favored Romulus' selection of the Palatine Hill. In the jealous quarrel which followed, Remus leaped scornfully over the rude wall which his brother was erecting and was killed by Romulus, who then became the sole founder of the city. According to tradition, Romulus was succeeded by six legendary kings. See ROME, ANCIENT.

Rook, a bird of the Crow Family, about the size and color of the common crow. It is abundant in Europe, nesting in communities of several thousand which are called rookeries. The nests are large, made of sticks and placed in large, tall trees. Four or five greenish-spotted eggs are laid. Unlike the crow, the rook does not molest the farmer's field, being omnivorous in its food habits. It is sometimes tamed as a pet, and may be taught to imitate many sounds. In Europe the young birds are sometimes used as food. The rook is found in Europe, northwestern India, western Asia and northern Africa.

Roosevelt, *Ro' ze velt,* **Theodore** (1858-1919), twenty-sixth president of the United States, born in New York City. He is seventh in descent from a Dutch ancestor who emigrated from Holland to New Amsterdam (New York) in 1649, and the family has for generations been noted for high intelligence and public spirit. Being a delicate child, he was educated at home and out of doors rather than at school; and developed into a strong, active, vigorous youth. He graduated from Harvard in 1880, spent several months traveling in Europe, and upon his return studied law for a brief time at Columbia. He soon left his legal studies, however, to become actively engaged in politics, and in 1881 was elected to the New York Legislature as an opponent of the Tammany Hall machine. Here he served until 1884, and, although the youngest member of the House, became the recognized leader of the Republican minority. In 1884 he went West and bought a ranch at Medora, N. D., where he lived for two years.

Returning to New York City in 1886 he was defeated for the mayoralty by Abram S. Hewitt, the Democratic candidate. As a member of the Civil Service Commission from 1889 to 1895, he did much for the cause of civil service reform. Resigning this position in 1895, he became president of the New York Board of Police Commissioners, where he at once undertook a reorganization of the department, and for two years conducted a vigorous campaign against existing evils which gave him a national reputation. In 1897 he was appointed assistant secretary of the navy, and in this position his work was of great value in preparing the navy for its efficient work during the Spanish-American War. He resigned in 1898, and was active in organizing the First United States Volunteer Cavalry, popularly known as "Roosevelt's Rough Riders," of which he was made lieutenant-colonel, and afterwards colonel for gallant service.

When his command was mustered out in September, 1898, Roosevelt at once entered upon an active campaign for the

THEODORE ROOSEVELT

governorship of New York, and was elected, polling many independent votes. He instituted reforms in the administration of state business, especially in connection with the canals, greatly extended the civil service system, and secured the passage of a law taxing corporation franchises. Against his expressed wishes he was nominated as vice-president of the United States for McKinley's second term, and was elected in the fall of 1900.

Upon the death of President McKinley, Sept. 14, 1901, Mr. Roosevelt became his successor. Continuing the policy of his predecessor, he retained the same cabinet and pushed with characteristic vigor the administration's plans for trust regulation, tariff reciprocity, the retention and government of the Philippines and the construction of an isthmian canal. His own policies gradually developed and included, in addition, the revision of finance, the strengthening of the navy, the creation of a new department of labor and commerce, the establishment of a permanent census bureau, the insistence upon American rights abroad, the recognition of the Republic of Panama in connection with the building of the canal, and efforts to make the South American republics keep faith with European nations. These efforts, coupled with his aggressive independence, his honesty of purpose, his insistence upon the "square deal" and his warfare against the exploitation of the people by the "interests," made him a popular hero; and he was nominated for a second term by acclamation and elected by the largest plurality of votes in the history of the country. His second term continued the vigorous policy begun in the first, and his great influence led to the passage of a new Interstate Commerce Commission law and a pure food law.

More in the nature of individual triumphs for his strong personality and frank diplomacy were the arbitration of the anthracite coal strike in 1902 through his intervention, and the termination of the Russo-Japanese War by the Treaty of Portsmouth (N. H.) in 1905. His vigorous projection of himself into the affairs about him, however, did not always terminate so happily, and led to serious dissensions with Congress during his last months of office. Declining nomination for a third term, Mr. Roosevelt left for Africa immediately after the inauguration of his successor, where he remained for a year hunting big game and gathering specimens for the Smithsonian Institution and the National Museum at Washington. On his return journey through Europe he was everywhere received with the highest honors, and delivered notable lectures at universities in Paris, Berlin, Christiania and Oxford. His arrival in New York was marked by a tremendous popular demonstration of welcome.

On his return from Africa Colonel Roosevelt continued his work as contributing editor of *The Outlook*. He soon resumed his interest in politics and took an active part in the campaign for primary elections. In the spring of 1912, in response to an urgent call from the governors of several states and other political leaders and as a result of preferential presidential primaries in several states, he again became a candidate for the presidency, standing for the progressive wing of the Republican Party. When the Republican National Convention met in Chicago in June, 1912, it was apparent that there were irreconcilable differences between the conservative wing, whose nominee was President Taft, and the progressive wing. Although Mr. Roosevelt had the larger number of delegates selected by primary elections, his nomination could have been secured only by the seating of a large number of contested delegates. The committee on credentials decided in favor of Mr. Roosevelt in the case of only 19 out of over 200 contestants, and President Taft was duly nominated. However, over 300 of the Roosevelt delegates refused to participate in the nomination, and, leaving the hall, they proceeded to another hall in the city and took the initial steps toward forming the new Progressive Party. At the Progressive National Convention held in Chi-

cago in August, 1912, Mr. Roosevelt was nominated for president and Hiram Johnson, governor of California, for vice-president (See POLITICAL PARTIES IN THE UNITED STATES, subhead *Progressive Party*).

Mr. Roosevelt engaged in a remarkable speaking tour in the campaign, which took him to the Pacific coast and through the South. About three weeks before the election he was shot while in Milwaukee, Wis., on his way to address a political meeting. A feature of the incident which attracted widespread comment was the fact that he insisted on keeping his engagement, and delivered his speech before receiving medical attention. He was, however, obliged to forego further campaign work of an active nature. At the election in November, 1912, the Progressive candidates received 88 electoral votes, and a popular vote of 4,190,101.

Like many other public men, especially those of aggressive and forceful personality, Mr. Roosevelt has often been the victim of libelous stories. During the campaign of 1912 there was published in the *Iron Ore*, a weekly newspaper of Ishpeming, Mich., an editorial which stated that he was in the habit of getting drunk, and was guilty of habitual and disgraceful profanity. Mr. Roosevelt had long felt that public men who were the victims of malicious gossip against their private and moral characters should in some way be protected, and he had the courage to take a step that will undoubtedly have far-reaching influence: shortly after the publication of the editorial he sued the editor of the *Iron Ore* for libel. The case came to trial on May 26, 1913, and in the course of this trial a large number of well-known men testified in Mr. Roosevelt's behalf. The defendant confessed his inability to substantiate his charges in the slightest degree, and the trial was, therefore, a complete vindication for Colonel Roosevelt. Newspapers throughout the country recognized that he had performed a real public service.

In October, 1913, he started on a tour of South America, delivering addresses at Buenos Aires, Rio de Janeiro, and other cities, and spent five months exploring the wilds of Brazil, discovering a new river, named in his honor, Rio Theodoro. In 1916, he was again nominated for the presidency by the Progressive Party, but declined the nomination and indorsed the Republican candidate, Charles E. Hughes. His writings are numerous, and include *The Naval War of 1812*, 1882; *The Winning of the West* (4 vols.), 1889-1896; *Life of Thomas Hart Benton*, 1887; *Life of Gouverneur Morris*, 1888; *American Political Ideals*, 1897; *The Strenuous Life*.

Root, the descending axis of the plant and the main organ by which it receives

ROOTS

1. Fibrous
2. Taproot
3. Spindle-shaped
4. Turnip-shaped
5. Tuberous roots

food and moisture. The root is ordinarily underground, and the general direction of its growth is downward. Roots also serve to anchor plants to the ground and hold the stems erect. They are distinguished from stems by having protective coverings and rootcaps, but no leaves. Plants not having these rootcaps are rare and are provided with enveloping sheaths, not grown from the roots, but answering the purpose of the rootcap. Roots, like stems, may become much-branched, and it is noticeable that there is a proportional development of leaf area and root area.

Roots are classified according to their size, shape and manner of growth. A root which is a downward projection of

the main stem is called a taproot. All other roots are termed lateral roots, with reference to their relation to the taproot. Fibrous roots are threadlike and slender. Fleshy roots are those which have become storehouses for nourishment which is to be used in the next season's growth. The carrot is an example of this class. Adventitious roots are those which occur in unusual places and may be found on any part of the plant. Roots which form on willow stems when cut, and those which appear on begonia leaves when placed on a moist surface, are good examples. Aerial roots sometimes appear on the stem in the open air, but tend ordinarily to reach the ground. The Indian corn has these aerial rootlets near the base of the stem.

Roots are said to be annual, biennial or perennial according to whether they live one, two or many years.

Root, Elihu (1845-), an American statesman, born in Clinton, N. Y. He entered upon the study of law after graduating from Hamilton College, and in 1867 settled in New York and began to practice. He rapidly acquired prominence and from 1883 to 1885 served as United States district attorney for the southern district of New York. From 1899 to 1904 he was secretary of war, and in 1905 became a member of President Roosevelt's cabinet, succeeding John Hay as secretary of state. Four years later he was elected United States senator from New York. During his official term of service Mr. Root did much to strengthen our relations with foreign nations. He has also been a leading factor in the successful adjustment of our colonial affairs. He was awarded the Nobel peace prize for 1912.

Root, George Frederick (1820-1895), an American composer, born in Sheffield, Mass. While a boy he learned to play several musical instruments and at the age of 18 he went to Boston, where he began teaching music. From 1839 to 1844 he taught music in the Boston public schools. After that he went to New York and engaged in teaching in a number of educational institutions. Root was one of the most popular of American composers and gained national fame through his patriotic songs: the *Battle Cry of Freedom; Just Before the Battle, Mother; Tramp, Tramp, Tramp the Boys Are Marching;* and a number of others. He was also the author of the quartet *There's Music in the Air* and of numerous cantatas, and was the originator of the normal music institutes.

Rope. See CORDAGE.

Rope and Pulley. See PULLEY.

Rorqual, *Ror' kwal,* one of the largest whales, having an average length of 75 ft. and often attaining 85 or 90 ft. It has a blackish-yellow body with sulphur spots upon the belly and, unlike most whales, has a prominent dorsal fin. The flukes of its tail lie at right angles to the body. The rorqual is sought for its whalebone, which is black in color and not of large size. This species of whale is also known as finback and as sulphur bottom. See WHALE.

Rosa, Monte, *Mone' ta Ro' zah,* a mountain of Switzerland located in the Pennine Alps not far from the Matterhorn, above which it towers. Its height is 15,217 ft., not 600 ft. less than that of Mont Blanc. This great snow-covered mountain, with its huge Görner Glacier at the north, has the Monte Rosa Observatory, which was established there in 1904 at an altitude of 15,000 ft. This makes it of great scientific interest.

Rosa, Salvator, *Sahl vah' tor Ro' zah,* (1615-1673), an Italian painter, poet and musical composer, the chief master of the Neapolitan School of Painting, born near Naples. He studied music and poetry before he took up painting. As a youth he wandered among the mountains of southern Italy, making sketches and meeting, occasionally, the banditti who appear frequently in his pictures. In 1639 he took up his residence in Rome, and there rapidly acquired fame as a poet, musician and painter. Having incurred the enmity of the Inquisition by two satirical pictures—*Human Frailty* and *Fortune*—he removed to Florence,

where he remained for nine years. His last years were spent in Rome. Salvator's chief power lay in painting landscapes, marine views and battle scenes. His landscapes are somber in subject and coloring; he preferred to paint the grewsome aspects of nature. His notable works include *Mercury and the Dishonest Woodman* (National Gallery, London); *Stormy Sea* (Berlin Museum; *Warrior Doing Penance* (Vienna Museum); *Coast Scene* (Palazzo Colonna, Rome). He also painted a number of excellent portraits.

Rosario, *Ro sah' re o,* a city of Argentina, situated on the west bank of the Paraná, 170 m. n.w. of Buenos Aires, with which it has railway connection. Other railways extend to the surrounding provinces, and the city has direct steamer connection with Europe and the United States. It is one of the important commercial centers of South America and is the second city of importance in Argentina. It has large exports of wool, hides and grain. The city has a national college, several hospitals and theaters and a street-car system. Population in 1911, 176,076.

Rosary, *Ro' za ry,* among Roman Catholics the recital of 15 decades of Hail Mary's, each decade being preceded by the Lord's Prayer and followed by a Gloria. The prayers are counted on a string of blessed beads, usually only five decades long. This is called a chaplet. During the repetition of each chaplet some mystery in the life of the Lord or of the Virgin Mary is contemplated. This prayer, said on pebbles or beads, dates from the days of the anchorites. St. Dominic, however, is credited with having determined upon the number of Hail Mary's, and, divinely inspired, to have added meditation of the mysteries. The rosary is believed to have been given to the Catholic Church as a means of defense against the Albigenses, who were attacking the veneration shown to the Blessed Virgin.

Rose, a family of common, ornamental shrubs familiar everywhere in temperate zones. The many wild varieties all have the same characteristics: climbing or creeping, woody stems, seldom thornless; shiny, deeply-veined leaves, generally of a bright green color; flowers with a green five-parted calyx upon which are borne the variously colored petals. The common wild rose, which is the state flower of North Dakota and of Iowa, has a single row of broad, pink petals, a leaf made up of five little leaflets, and a prickly, rather than thorny, stem. The flower is faintly fragrant. The brier rose, a native of Europe, is a woodside rose that flowers all summer.

Cultivated roses generally have seven, rather than five, leaflets to a leaf, and bear beautiful, heavily-scented flowers. The American beauty, a species produced under cultivation in the United States, is a favorite red rose. One cultivated rose is the state flower of New York. Cross-fertilization and grafting have produced so many varieties of roses that only the initiated can always distinguish between them and ordinarily people are content to name them simply by their color. For decorative purposes the rose is probably the most satisfactory and the most admired of blossoms.

Red and white roses are the national flowers of England and of Persia. The Cherokee rose, a Chinese rose that has been naturalized in the United States and grows well in the South, is often seen in gardens. The Christmas rose, which blooms under the snow in December, is not a rose at all, but a member of the Buttercup, or Crowfoot, Family, and the rose of China is a rose mallow of the Mallow Family. See SWEETBRIER.

Rosebery, *Roze' ber y,* **Archibald Philip Primrose,** FIFTH EARL OF (1847-), a British statesman, born in London. In 1868 he left Cambridge by request, and his grandfather dying the same year, he took his seat in the House of Lords, allying himself with the Liberals. His marriage in 1878 to the only daughter of Baron Rothschild brought him powerful friends in the financial world. From 1881 to 1883 he was undersecretary of state for home affairs,

later he became the first commissioner of public works and the first chairman of the London County Council, and in 1892 he was appointed foreign secretary in the cabinet of Gladstone, on whose retirement, in 1894, he became prime minister. Although popular with the people, his ministry was defeated in 1895. Lord Rosebery is an eloquent speaker and has published *William Pitt, Sir Robert Peel, Questions of Empire* and *Napoleon: the Last Phase.*

Rosecrans, *Ro' ze kranz,* **William Starke,** (1819-1898), an American soldier, born in Kingston, Ohio. He graduated from West Point in 1842, entered the engineering corps, and was assistant professor there in the military school from 1843 to 1847. In 1854 ill health caused him to resign from the army and become a civil engineer; but at the outbreak of the Civil War he became an aide to McClellan. Having won a victory at Rich Mountain, he was commissioned brigadier-general, succeeded McClellan in command in western Virginia, was division commander at the siege of Corinth and, at the head of the Army of the Mississippi, defeated Price at Iuka, Sept. 19, 1862, and Van Dorn and Price at Corinth, the following month. While commanding the Army of the Cumberland in December, 1862, he won the Battle of Murfreesboro, converting a seeming defeat into victory; but in September, 1863, he was defeated by Bragg at Chickamauga and was succeeded by General Thomas. In 1864 he commanded the Department of Missouri, frustrating Price's raid on that state, but was shortly relieved of all command; he resigned from the army in 1867. The following year he was minister to Mexico, from 1881 to 1885 he was congressman from California and from 1885 to 1893 he was register of the United States Treasury. In 1889 Congress restored him to the rank and pay of brigadier-general.

Rose'mary, an evergreen shrub of the Mint Family. It is a low plant with square stems, long, thin leaves with saw-toothed margins, and pale blue flowers. The stems are much-branched, and the flower stems grow in the joint made by the union of the plant stem and leaf stem. The petals of the flowers are irregular, the upper being divided into two and the lower into three parts. A fragrant oil is distilled from the leaves and stem. Rosemary is a native of southern Europe and grows commonly in the South.

Marsh rosemary is a member of the Leadwort Family and is a seaside plant. It has a branched, almost leafless stem and pale lavender flowers having five petals. It flowers in the summer and is found in salt marshes of the Atlantic States.

Rose of Jericho, *Jer' i ko,* or **Res"urrec'tion Plant,** a Syrian plant of the Mustard Family known in the United States chiefly through its sale as a curiosity. The plant has slender, fibrous stems which branch angularly and contain a watery, biting juice. The leaves are paddle-shaped and the flowers, which cluster close to the branches, are insignificant. After the plant has bloomed, the leaves fall and the branches curl about the seed cases, forming a ball which breaks from the parent stem and is easily blown by the wind or rolled along the ground. If it reaches water, the branches uncurl and seem to return to life. They live merely long enough, however, to discharge the seeds. If the balls are picked off before fully dried they will retain for years this power of expanding and contracting according to the amount of surrounding moisture. In this form they are sold everywhere under the title resurrection plant.

Roses, Wars of the, the contest for the English crown between the rival houses of Lancaster and York in the latter half of the 15th century. The name is derived from the fact that the badge of the House of York was a white rose, and that of Lancaster a red rose. Both factions were descended from Edward III: the House of Lancaster through John of Gaunt, Duke of Lancaster, the fourth son; and the House of York through Lionel, the second son. The

House of Lancaster had attained the throne in 1399 by an act of Parliament which deposed Richard II, descended from the eldest son of Edward III. The three kings of the Lancastrian line were Henry IV, Henry V and Henry VI. The third was only nine months old when he succeeded to the throne, and he grew up physically and mentally weak, finally becoming insane.

The people and Parliament turned from his misrule to Richard, Duke of York, one of whose ancestors had married a descendant of the second son of Edward III, thus giving him a double and prior claim to the throne. The resulting contest lasted, with brief intermissions, for 30 years, from 1455 to 1485. The forces of Henry VI were defeated at the Battle of St. Albans in 1455. Five years later his Queen, Margaret of Anjou, raised an army and won the Battle of Wakefield, in which Richard of York was slain. His son defeated the Lancastrians at Mortimer's Cross (Feb. 2, 1461), hastened to London, where he was crowned as Edward IV, and then won the decisive Battle of Towton. In 1469 the Earl of Warwick took Henry's part, Edward was compelled to flee to Holland, and Henry was reinstated on the throne. Edward returned, however, in 1471, defeated the forces of Warwick at Barnet, and those of Margaret at Tewkesbury, and resumed the crown.

Edward IV was succeeded in 1483 by his young son Edward V, who, with his brother Arthur, was murdered in the Tower, presumably by their uncle, who then became king as Richard III. This king's unpopularity enabled the Duke of Richmond, head of the House of Lancaster since the death of Henry VI, to organize an army, win the Battle of Bosworth Field (1485), in which Richard was slain, and assume the crown as Henry VII. He then married Elizabeth, daughter of Edward IV and heiress of the Yorkist family, thus uniting the two rival lines. The Wars of the Roses practically exterminated the ancient nobility, thereby removing the last vestiges of feudalism, reduced the power of Parliament and paved the way for the despotism of the Tudor kings, whose line began with Henry VII.

Rosetta, *Ro zet' a,* **Stone,** a slab of black basalt covered with inscriptions in three different characters, the Greek, the sacred and the common written languages of Egypt. It is three and one-half feet long, two and one-half feet wide and almost a foot thick. M. Boussard, a French officer, discovered it in 1799 near Rosetta, Egypt, during excavations. Three years later it was taken to the British Museum. Dr. Thomas Young in 1818 and M. Champollion, working independently, gave the same interpretation to the Egyptian characters. The deciphering of this stone gave the key to the reading of other Egyptian inscriptions.

Rose'wood", a term applied to various hard, close-grained woods obtained from different species of trees, so named from their roselike scent when freshly cut. Rosewood is generally dark-colored, with several shades and stripes, and is used extensively in making furniture, piano cases and cabinets. As rosewood is expensive, it is employed principally as veneers for ornamental purposes. It is obtained from Brazil and other countries in South America, which produce the best. Inferior grades are found in the West and East Indies.

Rosin, *Roz' in,* a material produced when water and turpentine are mixed and distilled. Crude turpentine, obtained from pine trees, yields about 75 per cent of rosin. When entirely freed from water, it is translucent and the odor is similar to that of turpentine. Rosin is produced in large quantities in British Columbia, North Carolina and Florida. It is extensively employed in making soap, sealing wax, paints, varnishes, ointments, liniments and cements. See RESIN; TURPENTINE.

Ross, Alexander Milton (1832-1897), a Canadian naturalist, born in Ontario. He studied medicine in New York. During the Civil War he served in the Federal army as surgeon and confidential correspondent to Lincoln in Canada, and

following the war served under Jaurez in Mexico. Returning to Canada, he entered upon the study of natural history, adding valuable information concerning the flora and fauna of his country. He published *Birds of Canada, Butterflies and Moths of Canada, Forest Trees of Canada, Ferns and Wild Flowers of Canada* and *Mammals, Reptiles and Fresh Water Fishes of Canada.*

Ross, Sir George William (1841-1914), a Canadian statesman, born in Ontario and educated at Albert University. He was early connected with school work, advocating the uniformity of textbooks and the limiting of normal schools to professional purposes. A Liberal, he sat in the House of Commons for West Middlesex from 1872 to 1883, when he became minister of education in the Mowat administration, retaining the same position under Mr. Hardy, and from October, 1899, to February, 1905, he was premier of Canada. He continued to lead the Opposition until called to the Senate by Earl Grey, in January, 1907. King George knighted him in 1910. Sir George had journalistic connections with the Strathroy *Age,* the Huron *Expositor,* the Ontario *Teacher* and the Toronto *Daily Globe;* he also wrote several separate works of educational or historical value and he won recognition on the lecture platform. He was the author of *The Life and Times of the Hon. Alexander Mackenzie, The School System of Ontario, A Report of the Schools of England and Germany* and a number of works on Canadian history.

Ross, James (1848-), a capitalist, born in Scotland. He came to America in 1868, being successively resident engineer of the Ulster & Delaware Railroad, chief engineer of the same road, resident engineer of the Wisconsin Central and of the Lake Ontario Shore Road and finally general manager of the Victoria Railway in Canada. Later he was general manager of the Credit Valley Railway, which he built; controlled the construction of the Canadian Pacific over the Rockies, Selkirk and the Gold Range; built the Regina & Long Lake and the Calgary & Edmonton roads; and in 1892, with Sir William Mackenzie, purchased from Toronto the Toronto Railway, which he later made into an electric line. The street railways of Montreal, Winnipeg and London were afterwards changed by him from horse to electric lines, and in England, in 1896, he and Sir Mackenzie formed the City of Birmingham Tramways Company.

Rossetti, *Ro set' e,* **Christina Georgina** (1830-1894), an English poet, the sister of Dante Gabriel Rossetti, born in London. During her life of retirement, colored by the sorrows of ill health and poverty, she grew saintlike in nature, and the religious beauty of her face caused her brother and others to use it as a model in their painting. With her mother she taught school and later spent six months in traveling on the Continent. Her first book, *Goblin Market,* revealed the exquisite delicacy of her poetic touch and gained immediate recognition among the Pre-Raphaelites. There is a lightness and a glow in her lyrics and a quiet depth in her religious verse which few women writers, perhaps none except Mrs. Browning, have attained, and in the purity of her verse her cloistered spirit found noble expression. Among her best poems are *Passing and Glassing* and *After Death.* She published the volumes, *Verses; The Prince's Progress, and Other Poems; A Pageant, and Other Poems; New Poems;* and *Maude: Prose and Verse.*

Rossetti, Dante Gabriel (1828-1882), an English poet and painter, born in London. His father, Gabriele Rossetti, was an Italian patriot and author who had removed to England to escape political persecution. Dante was the eldest of four children, two others of whom also became eminent as writers: William Michael as a critic, and Christina as a poet. Dante spent five years at King's College, studied in Cary's Art Academy and in the Royal Academy, and at 20 became a pupil of Ford Madox Brown. About this time he united with a number of young painters and sculptors, in-

cluding Holman Hunt, Burne-Jones and Millais, in organizing the Pre-Raphaelite Brotherhood, a society which had for its purpose the redemption of English art from conventionality. These young artists took as their models the early Italian painters preceding Raphael, and they sought to express in their work the simplicity, idealism and purity of the old masters. In 1860 Rossetti was married; two years later his wife died, and so bitter was his grief that he never recovered from the effects of the shock. Lonely brooding over the loss, in addition to the unfortunate effects of a drug which he took for insomnia, threw a shadow over his later years. He died at the age of 54.

Rossetti gained distinction both as a painter and as a poet. One of his most remarkable poems, *The Blessed Damosel,* was written at the age of 20. On the death of his wife he despairingly placed all his unpublished writings in her coffin, where they remained until his friends persuaded him to allow them to be exhumed. This was done in 1869, and the following year they were published. A second volume of poems, published in 1881, and a volume of translations from the early Italian poets constitute the rest of his poetical work. As a whole his poetry is characterized by picturesqueness and visual beauty; there is a constant appeal to the eye, an elaborateness of imagery. This elaboration is especially apparent in his sonnet-sequence, *The House of Life,* a series of poems dealing with his love for his wife. The early lyrics have greater simplicity and spontaneity. *Hand and Soul* is a delicate prose story, his only imaginative work in prose.

Rossetti's paintings may be divided into three groups. The first division includes the small Biblical pictures, typical of which are the well-known *Ecce Ancilla Domini* and *Girlhood of Mary Virgin.* The second group includes the Dante pictures, such as *Dante's Dream, La Donna della Finestra* and *Beata Beatrix.* In the third group are the paintings representing the soul—*The Blessed Damosel, Fiammetta, The Day Dream.* His paintings, like his poems, are imbued with mysticism and medievalism.

Rossini, *Ros se' nee,* **Gioachino Antonio** (1792-1868), an Italian operatic composer, born at Pesaro, the son of a strolling musician. He studied at the Conservatory of Bologna, where, at the age of 16, he won a prize for a cantata. His first opera was written when he was only 18 years old, but his first great triumph came with the production of *Tancredi,* three years later. He became director of the Italian Theater in Paris in 1824. His last work, and probably his greatest, was *William Tell,* written in 1829. In the following years he wrote little except some sacred pieces, among them the famous *Stabat Mater.* He wrote to satisfy the popular taste and was witty and vivacious and very popular in his day. Two of his well-known operas are *The Barber of Seville* and *Otello.*

Ross'land, a city of Canada in the Province of British Columbia, on the Columbia and Western Branch of the Canadian Pacific Railway and the Red Mountain Branch of the Great Northern Railway, about 6 m. n. of the United States boundary. The city is the center of an important mining district. It is claimed that the deposits of gold within a radius of 12 m. from Rossland equal or excel those of any similar area in the world. Silver and copper are also found. Among the important buildings are hotels, churches, schools and banks. Saw and flour mills and bottling works are located here.

Rostand, *Ros' tahn',* **Edmond** (1868-), a French dramatist, born in Marseilles. His first play, the burlesque, *Les romanesques,* was produced in 1894 at the Théâtre Français, and was followed by *La princesse lointaine* in 1896 and by *La Samaritaine* in 1897, the leading part in each being created by Sarah Bernhardt. *Cyrano de Bergerac,* also produced in 1897, created a greater sensation than any other drama in verse in many years. The hero is a French historic character of the 17th century, and

the play was widely translated and was admirably produced in America by Richard Mansfield. *L'Aiglon,* presented in 1900, has for its hero the unhappy son of Napoleon, and *Chantecler,* of 1910, aroused as much interest as *Cyrano de Bergerac.* In the American production, the title rôle of this latter play was assumed by Maude Adams.

Roswell, *Roz' wel,* **N. M.,** a city and the county seat of Chaves Co., about 172 m. n.e. of El Paso, on the Atchison, Topeka & Santa Fe and other railroads. It lies in the valley of the Pecos River a few miles from that stream. The climate is mild, dry and healthful. The rainfall is insufficient for the needs of agriculture, but parts of the surrounding district have been made productive through irrigation, the means for which are furnished by a government reservoir about 12 m. from the city. Chief among the features of interest in the town are New Mexico Military Institute, a Carnegie public library and St. Mary's Hospital. Roswell was incorporated as a city in 1904. Population in 1920, 7062.

Rot, a name applied to several fungus and bacterial diseases that affect certain domestic animals and plants. The commonest among domestic animals are foot rot (See Foot Rot) and a disease known merely as rot, which is caused by a parasite in the liver of sheep. The rots of plants are of more frequent occurrence. The most common are: the black rot of grapes, a great pest to vines and one which causes the fruit to decay; root rot of trees, a fungus disease attacking the crown of the root of the pines and so spreading to the branches; the heartwood rot, of the oak, alder, willow and poplar; the foot rot of the orange and lemon, causing a gummy excretion near the base of the stem; brown rot of fruit, a disease attacking apples especially and causing the skin to become shriveled and covered with brown patches; and dry rot, which attacks damp lumber and causes it to decay (See Dry Rot). These are so different in their mode of attack and in their effects that various treatments must be resorted to. Affected fruit trees should be sprayed with Bordeaux mixture (See Fungicide) and all decayed fruit should be picked up and destroyed. For description of the separate diseases and their treatment, consult Massee, *A Text-Book of Plant Diseases.*

Rota'tion of Crops, the sowing of a series of crops in order to prevent the depletion of the soil. Different crops require different kinds of plant food, and if one crop is planted year after year in the same field, the food which it requires is exhausted. It has been said that more American farms have been ruined by one-crop farming than by any other method; notable instances are tobacco fields in Virginia and Kentucky, cotton fields in the Gulf States, cornfields in the Central States and wheatfields in the North Central States. The old idea that land needs "resting" every four or five years is being superseded by the better one that soil may be continuously worked to its fullest capacity if a provision is made for returning to it a part of the fertility that has been removed. This may often be accomplished by means of an intelligent rotation. Rotations may require only one-year or may be two-, three- or four-year rotations. As generally practiced, a farm is divided into as many fields as there are crops in the rotation; as, for instance, in the rotation of wheat, oats and corn, the farm is divided into three fields, each of which is planted to a different crop. The second year the field which before had wheat is planted to oats, the third year to corn and the fourth to wheat again. The other fields are treated to the same rotation; thus no field has the same crop for two successive years, but rather at intervals of three years.

Rotation has many advantages. The labor upon the farm is more evenly distributed to the land. Plant food, which is apt to be washed away if left unused in the soil, is thus saved. Deep-rooting plants stir up the subsoil. Leguminous crops, such as clover, beans and alfalfa, store nitrogen in the soil and leave it richer than they found it. Insects and

plant diseases which attack one crop die out when their food is not provided. A systematic rotation keeps the ground covered with crops the most of the year, and keeps the farmer from having bare fields which lose much of their fertility. A few crop rotations suggested by Prof. Lyman Carrier are as follows:

1. A four-year rotation for general farming.
   - 1st year. Corn seeded to wheat in the fall, with clover and timothy sown at the same time as the wheat or the following spring.
   - 2nd year. Wheat.
   - 3rd year. Hay.
   - 4th year. Either hay or pasture.

In this rotation a crop of oats seeded in the spring is often substituted for the wheat, the clover and grass being seeded at the same time as the oats. Many farmers are beginning to sow their clover and grass seed after the small grain is harvested, using a disk harrow to prepare the seed bed.

2. A three-year rotation commonly practiced in tobacco-growing districts.
   - 1st year. Tobacco.
   - 2nd year. Wheat.
   - 3rd year. Clover, either cut for hay or plowed under.

3. A three-year rotation for the Cotton Belt.
   - 1st year. Cotton.
   - 2nd year. Corn with cowpeas between the rows.
   - 3rd year. Small grain, usually oats, followed with cowpeas.

4. A five-year rotation recommended for live-stock farms.
   - 1st year. Corn, seeded at the last working to crimson clover.
   - 2nd year. Crimson clover, cut for hay or plowed under, followed with cowpeas to be cut for hay and the land seeded to some small grain.
   - 3rd year. Small grain, wheat, oats or rye, stubble to be disked and seeded to a mixture of clover and grass.
   - 4th year. Hay.
   - 5th year. Hay or pasture.

Roths'child", the "Red Shield," the name of a Jewish family long famous in the world of finance, derived from the sign of a red shield used by Mayer Anselm Bauer, founder of the family, at his place of business in Frankfort-on-the-Main. He was born in 1743; developed exceptional financial ability; became agent for the Elector of Hesse-Cassel; and when the Elector was driven out by the French, handled his properties so skillfully that later he was able to turn them back with five per cent interest. Mayer Anselm's five sons became hereditary landowners of Austria in 1815; and there, seven years later, were created barons. They added banking houses in Vienna, London, Paris and Naples to cooperate with the Frankfort institution.

In 1810, Nathan Mayer (1777-1836) of London, the third son, staked his all for the British Government and the allied powers in support of Wellington's campaign, and is said to have been present at the Battle of Waterloo. From his operations at this time dates the tremendous financial power of the Rothschild family. His son Lionel (1808-1879) was several times elected to Parliament; and, by special act in 1858, was finally permitted to take his seat without repeating the last words of the oath—"on the true faith of a Christian." Thus Jewish emancipation in England was accomplished. Lionel's son Nathan (1840-1915) was created a peer as Baron Rothschild in 1885. Descendants of the five brothers still direct the various banking houses, except the one at Naples, which was discontinued in 1860.

Rot'terdam", the second largest city of Netherlands and its principal commercial port. It is situated in the Province of South Holland on the Meuse River, 15 m. s.e. of The Hague. Hoog Straat (High Street) divides it into two parts, and the wooden buildings of the old quarter are gradually being supplanted by the handsome, substantial edifices of the new. Groote Market is the main square. The Groote Kerk is a Gothic structure dating from the 15th

century, and is noted for its large organ and its monuments to Dutch naval heroes. North of the city is the zoological and botanical garden founded in 1857. The picture gallery in the Boyman's Museum is distinctive for its admirable collection of Dutch paintings; other buildings are the exchange, the courthouse, the town hall and a tower containing a set of chimes. Shipbuilding is the principal industry, and the dock and harbor system of Rotterdam is among the most extensive in the world. Chemicals, spirits, leather, cigars and sugar are among the various manufactures. Population, about 500,000.

Rouen, *Roo" ahn'*, a city of France, the capital of the Department of the Seine-Inférieure (Lower Seine), situated on the north bank of the Seine, 87 m. by rail n.w. of Paris. Several of the narrow, picturesque streets are lined with medieval houses; others are straight and laid out in regular order, and contain fine stone houses. The finest specimens of the ecclesiastical architecture of the city are the Cathedral, in Gothic style, and the Church of St. Ouen. Among the secular buildings are the Palais de Justice, the Hôtel de Ville, the Hôtel Dieu and the belfry, or Tower of the Great Clock, dating from the 14th century. Rouen marks the scene of the martyrdom and death of Joan of Arc, the Maid of Orleans. The principal industries are shipbuilding and the manufacture of cotton goods, lace, shawls, hosiery, mixed silk and wool fabrics, chemicals, shot and refined petroleum. It was formerly the capital of the Duchy of Normandy, and was from 1419 to 1449 in the hands of the English. During the war of 1870-71 it was occupied by the Germans. Population, about 116,000.

Rouge, *Roozh*, a fine, powdered material made from crystals of sulphate of iron and employed by brass finishers and jewelers for polishing purposes. The term is also applied to a cosmetic used to redden the cheeks and lips. This is prepared from the safflower and has a brilliant scarlet color.

Rough Riders, the name of the first regiment of volunteer cavalry in the Spanish-American War. The regiment was organized and commanded by Theodore Roosevelt, who had the rank of colonel. It consisted almost entirely of cowboys. The regiment took a prominent part in the battles of El Caney and San Juan.

Roumania or **Rumania,** *Rou ma' ni a*, a constitutional kingdom in the southeastern part of Europe extending from east Slovakia and Galicia on the north to Bulgaria on the south, from Hungary on the west to Ukrainia and the Baltic Sea on the east. At present the kingdom includes the Roumania territory as determined by the Treaty of Bucharest, closing the second Balkan War; the former Austrian crownland of Bukowina; the Hungarian province of Transylvania; and an ill defined extent of territory in the Banat of Temesvar, formerly a Hungarian province. These countries voted for union with Roumania in December, 1918. At that same time Besarabia—a territory between the Pruth and the Dniester rivers in south west Russia—also voted to join Roumania but the status of Besarabia is not fully determined. The new kingdom comprises a compact section of Europe predominately Roumanian in ethnology and its boundaries indicate an area between eighty and ninety thousand sq. m. in extent, possessing a population between fifteen and sixteen million in number.

The Country. The northern part of Roumania is mountainous and the Carpathians send a bold range of mountains to the south forming the boundary between Transylvania and Moldavia, then turns sharply to the west and continues as the Transylvanian Alps—the boundary between Transylvania and Wallachia. To the east and south of the mountains the country gradually subsides to the valleys of the Sereth and the Danube rivers. Transylvania, ringed round by mountains except on the Hungarian frontier, is a broken rugged section. There are about 175 miles of coast line on the Black Sea. The entire coun-

try is celebrated for its scenic attraction. The picturesque beauty of the Carpathian mountains equals those of Switzerland. The soil is very fertile. Roumania has been one of the granary countries of Europe. The climate is continental; the seasons about like those of the eastern part of the United States.

The People. The people that united as Greater Roumania are entirely surrounded by Hungarian and Slavic people. They are separated from Italy by five hundred miles of space and sixteen hundred years of time; but their features, language, monuments, customs,—not less than their name—show their Latin origin. They present a striking instance of the persistence of ethnic traits that survived centuries of Turkish misrule and, in the case of Transylvania, determined efforts on the part of Austria-Hungary to denationalize them.

Industries. Agriculture is the principal occupation of the country. The soil is very fertile being a continuation of the fertile belt of south Russia on one hand, and the great Plain of Hungary on the other. Great forest wealth is found in the highland sections. The trees include oak, beech, pine, maple and walnut. Timber for construction purposes is exported in large quantities. The principal crops are wheat, corn, barley, oats, and rye. Other small crops are raised and vineyards are extensive. Among the fruits we find apples, pears, cherries, and small fruits. The oil bearing belt in Galicia extends into the Moldavian or northern province of old Roumania and the traveler from the United States would note the familiar derricks and flowing and pumping wells. A pipe line extends to Kustendje on the Black Sea which has been made a first class port. The production runs far into the millions of barrels yearly.

History. In the first century of our era that section of Europe was the Roman province of Dacia. Owing to its natural advantages and consequent prosperity it was known in history as "Dacia Felix." But before the close of the second century Rome could not defend that distant frontier, and Dacia was abandoned. It was this long and prosperous period that explains the racial peculiarities of the Roumanians and their resemblance to the Italians of today. Left alone this Roman colony was not strong enough to resist the invasions of Asiatic people who took the Danube Valley route to Central Europe such as the Huns and Magyars, and later the Tartars and often for long period of years the inhabitants took refuge across the Danube and in natural fortresses of the Carpathian Highlands. After an invasion had subsided, they would venture again into the plain section.

In the thirteenth century two stable states were formed,—the one to the south, between the Carpathians and the Danube was Wallachia; the one to the east, between the Carpathians and the Pruth River, was Moldavia. These two states, hinged as in an elbow joint, have since formed the main part of Roumania. In 1600 the prince of Wallachia succeeded in uniting to his province the Roumanian sections near him, and Wallachia of his day was essentially the same in area as Roumania of today. This union was but brief, before the close of the century Transylvania was a part of Austria-Hungary, and both Wallachia and Moldavia were suzerain states of Turkey. They continued such with varying fortune until 1856. In the meanwhile Bukowina had been taken by Austria (1778) and Besarabia by Russia in 1813; returned, however, to Roumania at the close of the Crimean War.

The Congress of Berlin gave Besarabia to Russia (1878) but added to Roumania the Drobudja, at that time a Turkish province between the Danube and the Black Sea, now forming the Roumanian sea board. Roumania took an active part in the Balkan wars 1911-13. In the World War, after long hesitancy, Roumania joined the Entente Allies but was forced to conclude a disastrous peace with the Teutonic Allies early in 1917, which, however, was abrogated by the victorious Entente nations at the close of the war.

Round'heads", the name applied in derision to the Puritans by the followers of Charles I, who were known as Cavaliers. The Puritans had their hair closely cut and from this custom they received the name.

Rousseau, *Roo" so',* **Jean Jacques** (1712-1778), an eminent French writer, born at Geneva. His early education was meager, and of the first 35 years of his life there is little, except his *Confessions,* which is authentic. The *Confessions* are remarkably frank, but are generally considered to be somewhat imaginative. He spent several years in the home of Madame de Warens, where he met some of the most brilliant intellects of France and where he had ample opportunity for reading. During these years Madame de Warens was the ruling spirit in his life. Later he became secretary to the minister of France at Venice. However, he soon left the position because of real or fancied humiliating treatment and tried to secure justice at Paris, but soon found his efforts vain.

This experience set Rousseau to thinking upon existing social distinctions. During the next few years he mingled with all classes of society and tried to find a philosophical basis for existing conditions. During that time he met Thérèse le Vasseur, a totally illiterate young woman and not above the condition of a servant. He made her his permanent companion without marriage. She bore him several children, each of whom was taken by him immediately to the foundling asylum. Rousseau first came into public notice in 1750, the occasion being the publication of a paper in answer to a question propounded by the Academy of Dijon. The question was as to whether or not the progress in sciences and arts had made morals purer. Rousseau contended that it had not, but the eloquence and logic of his discussion were such as to secure for him the prize awarded by the Academy, and the publication of the paper made him famous.

In a second paper before the Academy, he made an equally profound impression, but he argued so effectively in favor of the equality of men that he was forever after considered a democrat, or an advocate of the people. He wrote several articles for the *Encyclopédie* and later published a novel *The New Héloïse* and another work entitled *The Social Contract.* These attacked the customs and conditions so violently that Rousseau was driven into exile. His other epoch-making work was *Émile,* which was indirectly a treatise on education. From this work Pestalozzi and Froebel obtained many ideas and great inspiration. Though a strange mixture of educational principles and social contradictions, it is considered a classic. These three works were instrumental in working great changes in society and education, though their far-reaching influence was not seen until after Rousseau's death. He was neither a novelist nor a philosopher, but his keen insight into human nature and his vivid descriptions made him one of the most brilliant and influential writers of the 18th century.

Routhier, *Roo" tya',* **Sir Adolphe Basile** (1839-), a Canadian statesman, born in the Province of Quebec and educated at Laval University. A leader of the bar, he was appointed a puisne judge of the Supreme Court of the Province of Quebec in 1873 and provincial chief justice in 1904, meanwhile, from 1897 to 1906, being judge of the Vice-Admiralty Court at Quebec and serving as administrator of the Government of the Province of Quebec in 1904 and 1905. Under the pen name of Jean Piquefort, he has written prolifically in French, among his works being the national song, *O, Canada,* and he has also lectured successfully. King George knighted him at his coronation in 1911.

Rowing, *Ro' ing,* the art by which several persons, but in contests usually four or eight, propel a boat, each using a single oar. The galleys of ancient times were propelled by rowers; and both history and literature contain many references to the oarsman, as well as to those who pole or paddle their boats. As a sport, however, rowing has been developed since about 1812, almost whol-

ly by the English-speaking world, and with the Thames as the principal center of interest. In 68 contests, begun in 1829, and held annually from 1856 to 1911, between eight-oared crews from the great English universities of Oxford and Cambridge, one resulted in a dead heat and 37 were won by Oxford. This course is about four and one-quarter miles, and the best time, 18 minutes, 29 seconds, was made by Oxford in 1911. Of the 45 contests between eight-oared crews representing Harvard and Yale, the latter has won 23, and is credited with the best record, 20.10 minutes, made in 1888 over the four-mile course at New London, Conn. Cornell, Wisconsin, Pennsylvania and other American universities participate in the Intercollegiate Regattas rowed on the Hudson at Poughkeepsie, N. Y. Here the best record was made by Cornell's *eight* in 1901 —18 minutes, 53 1-5 seconds. France, Holland, Germany and Belgium have also developed much interest in rowing, as have Canada, Australia and New Zealand. Rowing associations are maintained in the United States and Canada.

When an individual uses an oar with each hand, he is said to be *sculling,* and the *sculls* commonly used are both shorter and lighter than the average oar, and are ordinarily quite concave. Sculling includes also the propelling of a boat by a single *scull* used over the stern, which the sculler faces; while the gondolier, who uses an oar over the stern, faces forward, and is said to row.

Improvements in rowing have been effected by the introduction of outriggers, light, iron brackets, which put the oarlock farther out and thus increase the rower's leverage; by the construction of keelless boats; and by the sliding seat, introduced at Yale in 1870. Eight-oared *shells* are sometimes made of papier-mâché or aluminum, but commonly of cedar. They measure approximately one foot in depth, two in width and 60 in length, and carry, beside the rowers, a steersman, or coxswain. The oars used in these shells are approximately 12½ ft. in length.

Rowland, *Ro' land,* **Henry Augustus** (1848-1901), an eminent American scientist whose name was connected with Johns Hopkins University from 1876 until his death. He was born in Honesdale, Pa., and studied in Rensselaer Polytechnic Institute at Troy, N. Y., and in many European schools where he carried on scientific research. Among his important investigations are the determination of the mechanical equivalent of heat, the magnetic effect of electric convection, the multiple telegraph and improvements for solar photography.

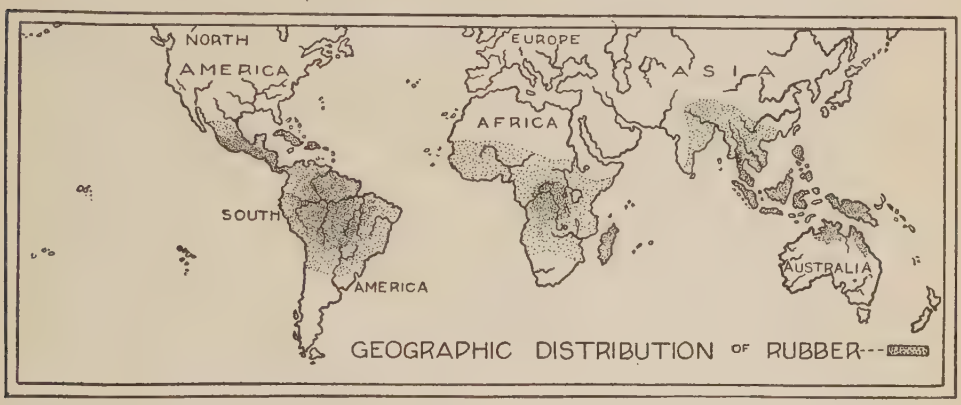
Royal Gorge, a remarkable canyon formed by the Arkansas River in the central part of Colorado. It is about eight miles long, in some places 2600 ft. deep, and is very narrow, forming one of the most picturesque canyons in America. It is traversed by the Denver & Rio Grande Railroad.

Royal Society, The, an association for the advancement of science. More fully, it is known as The Royal Society of London for Improving Natural Knowledge. It is one of the oldest societies in Europe and the oldest in England. It was founded in 1660, although weekly meetings had been held from 1645. From November to June every year the members of the society assemble every week and papers on scientific subjects are read and discussed. The important papers published in the series, *Philosophical Transactions,* have appeared annually since 1665. The transactions of the meetings and abstracts of the papers appear in the *Proceedings.* One of the chief phases of the work is the performing of experiments before members of the association. The members are known as fellows and number about 550, each one paying an annual fee of $20 or a life membership fee of $300. The Royal Society acts as an advisory body to the British Government on scientific undertakings of national interest.

Rubaiyat, *Roo bi yaht',* the term applied to a collection of Persian quatrains. The word is the plural of *rubai,* signifying quatrain, the distinctive Persian meter. Of the many Persian collections,

the most famous is the *Rub.'yát* of Omar Khayyám, which, translated by Edward FitzGerald, has become widely known. These quatrains are a concise expression of the poet's ideas on religion and philosophy. See OMAR KHAYYÁM.

Rub'ber, India Rubber or **Caoutchouc,** *Koo' chook,* a substance composed principally of carbon and hydrogen, and obtained from the milky juice, or latex, of various families of plants, mainly found in tropical countries. Most, as well as the best, of the commercial



crude rubber is produced in South America and known as Para rubber. In the basin of the Amazon and Orinoco occur a number of trees of the genus Hevea, belonging to the Spurge Family, which yield rubber. The Para rubber is principally obtained from a tree commonly known as the rubber tree. This is the tree which has been introduced into other parts of the world, notably Ceylon and British Malayasia, for the production of rubber. The Para rubber tree attains a height of over 60 ft., about six times its girth. The leaves are characteristically three-lobed, and the flowers are individually small and inconspicuous, but are borne in little sprays and are succeeded by dry fruits, each containing three seeds, resembling the castor-oil bean in color. Large quantities of rubber are also obtained from the Valley of the Congo River in the central part of Africa.

COLLECTING THE RUBBER. The trees are tapped by cutting grooves in the trunk in such a position that the sap will flow into earthen cups placed at the lower end of the groove. A good tree yields about 20 gallons of sap in a season, and this will make 50 lb. of crude rubber. The sap is evaporated by placing it in the sun or holding it over a fire. The latter method produces the better quality of rubber. The usual plan is to have a hollow cone of clay with a hole in its apex, which is placed over a fire made of the dried twigs and leaves of tropical plants. Into this hot smoke a paddle or stick, which has been dipped into the sap, is held. As fast as the amount collected is dried, more is added on the paddle, until 4 or 5 lb. have been collected. This mass is then removed from the paddle by cutting it through on one side. Several of these masses of crude rubber are packed in sacks holding about 100 lb. each.

GUAYULE RUBBER. Rubber from the guayule plant has recently been introduced and now supplies about one-seventh of the world's production. It is obtained from a plant closely related to the sunflower, whereas the other rubbers are chiefly obtained from trees or large woody climbers. The guayule is a small herbaceous plant growing in heights from a few inches to three and four feet, and is found principally in Mexico and in Texas, where it is being extensively cultivated. The milky juice is extracted

from the plant either by solvents or mechanical methods, the whole plant being removed and treated at the factories. The product contains a high percentage of resins, and is somewhat soft and sticky, but after treatment it is used to mix with Para rubber in the manufacture of the coarser articles, such as belting, motor tires, etc.

Corn Rubber. A good quality of rubber is made from corn oil by vulcanizing the oil. Corn rubber is of a coarse texture, but it readily mixes with rubber from the rubber tree. It is not so elastic as India rubber but is especially well suited to making buffers, soles and solid tires.

Manufacture. When the crude rubber is received at the factory, it is usually full of sand, dirt, pieces of bark, bits of leaves, stone and other foreign substances, and these must all be removed. This is accomplished by first putting the rubber into a tank of boiling water, then slicing it into pieces with knives, and afterwards putting it through a washing machine consisting of a pair of toothed rollers. Over these a number of streams of hot water are kept running to carry off the impurities as the rollers cut and squeeze them out, delivering the rubber in irregular strips.

The rubber now goes to a set of mixing rollers in the hopper, where sulphur and other mixtures are introduced, and at this stage finely-ground portions of reclaimed rubber from old overshoes, hose, tires and other rubber articles are all incorporated. The mass is now either carried to a set of steam-heated rollers to be rolled into sheets for coating cotton duck for making hose, tires, belting, etc., or to a kneading machine preparatory to being pressed into molds of various forms. The rubber is never melted but usually formed into a plastic state, in which condition it is easy to force it into the molds or into the fiber of cotton duck. This latter is accomplished by steam-heated rollers, one of which revolves more rapidly than the other, producing a friction or rubbing which presses the rubber thoroughly into the interstices and fibers of the fabric.

Vulcanized spread sheets are produced by spreading layers of India-rubber solution, previously charged with sulphur, on a textile base already prepared with a mixture of paste, glue and treacle. Vulcanization is effected by steam heat, and, the preparation on the cloth being softened by water, the sheet is easily removed. Porous or spongy rubber is made by incorporating some material which gives off a gas or vapor at the vulcanizing temperature, such as carbonate of ammonia, crystallized alum and finely-ground, damp sawdust. Uncombined sulphur in the rubber is injurious to it and often leads to the rotting of vulcanized goods, but an excess of sulphur is generally required in order to secure perfect vulcanization. High temperature and a large proportion of sulphur produce an extremely hard rubber known as ebonite or vulcanite. This takes a high polish, and is useful to the electrician on account of its insulating properties, and to the chemist because vessels of it are unaffected by most chemicals. A special kind of vulcanite containing red pigments is used under the name of dental rubber for making plates for supporting artificial teeth. This form of rubber, slightly modified, is used to insulate the telegraphic cables.

History. India rubber was first shown in 1770 by Priestley, the scientist, and employed to erase pencil marks. Its general use began in 1825, when Mackintosh of England took out a patent for incorporating a benzine solution of it into the fabrics which bear his name, for waterproofing them. Goodyear in about 1845 discovered that crude rubber could be hardened or vulcanized by adding sulphur to it and heating. India rubber is elastic, a poor conductor of heat and a nonconductor of electricity. It is soluble in neither hot nor cold water, but dissolves readily in chloroform, naphtha, oil of turpentine and bisulphate of carbon. Besides the crude rubber supplied from South American and African rubber trees, there are small quantities produced in Central America, Mexico, Cartagena, Java, Penang, Singa-

pore, Assam and Natal, from different trees and plants, each bearing the name of its source.

The great demand for rubber has led many chemists to attempt its production by artificial methods, and, while they have succeeded in a measure, yet the cost compared to that of natural rubber is so great as to make commercial success prohibitive. The world's production of rubber is estimated at about 100,000 tons per annum, about 60 per cent of which goes to the United States, where about half of it is used in automobile tires.

Rubens, *Roo' benz,* **Peter Paul** (1577-1640), one of the greatest masters of the Flemish School of Painting, and one of the most productive and versatile of artists. He was born in Siegen, Westphalia, the son of Jan Rubens, a man of considerable learning. When about ten years of age, young Rubens, a boy of exceptional intellectual precocity, went with his mother, then a widow, to Antwerp, the family seat. There he was allowed to choose his profession and to begin study. In 1598 he was officially recognized as a "master," and was permitted to work independently. Two years after this date he journeyed to Italy for the purpose of studying works of art, and was induced to enter the service of the Duke of Mantua, remaining with this prince eight years, and visiting Spain in the course of the engagement. In 1608 he returned to Antwerp and became court painter to the Archduke Albrecht; the following year he married Isabella Brant.

From this time Rubens became the most sought-after painter in Europe. His power increased and likewise his renown. Pupils flocked to his studio and commissions were arranged years in advance. The most powerful sovereigns of Europe paid honor to his genius; he was knighted by Charles I of England and by Philip IV of Spain. He was called to Paris in 1622 by Maria de' Medici to decorate the Luxembourg Palace with scenes illustrating her life. Rubens was an accomplished scholar, proficient in Latin, French, German, Spanish, English and Italian; and he acted many times in a diplomatic capacity when Spain, England and Holland were involved. His wife died in 1626, and four years later he married the youthful and buxom Helena Fourment, who appears on many of his canvases. His life was extremely successful and happy throughout, with never a sign of diminished artistic power or mental decline.

Rubens produced some 1500 paintings, which are now in the principal European galleries. He lacks the restraint of the Italians, their delicacy and grace; but in the domain of the spectacular he has no superior. He saw life as a pageant and on a large scale, and depicted gloriously the multifarious details in the human drama. His greatest work, *The Descent From the Cross,* remarkable for sympathy and religious spirit, faultless composition, color, harmony and the manner of treating flesh, is in the Antwerp Cathedral. Also famous are his *Crucifixion,* in the Antwerp Museum; the artist's sons and the *Emperor Maximilian I,* both at Vienna; *Castor and Pollux Abducting the Daughters of Leucippus, Children With a Garland of Fruit* and *Lion Hunt,* at the Munich Gallery.

Rubicon, *Roo' bi kon,* an ancient river of northern Italy, falling into the Adriatic Sea, and once forming the boundary between Italy proper and Cisalpine Gaul. It is thought that the modern Fiumicino is the ancient Rubicon. Julius Cæsar crossed it in 49 B. C., and declared war against the Roman Republic. Since that date "crossing the Rubicon" has become a historic phrase, signifying the taking of an irrevocable step.

Rubid'ium, a rare metal discovered in 1860 by Bunsen. It is found in some mineral waters and in the ashes of beets, tobacco, coffee and tea. Its salts are widely distributed but not in large quantities. The chief source of supply is Stassfurt, and as Stassfurt salts are used as soil fertilizers, it is probably by this means that it has become a constituent of plants. Rubidium and cæsium, an allied element, were discovered by means of the spectroscope, the first exhibiting marked

red lines, and the second, noticeable blue lines.

Rubinstein, *Roo' bin stine,* **Anton Grigorovich** (1829-1894), a Russian pianist, born at Wechwotynetz in Podolia, the son of a Jewish pencil manufacturer. The family removed to Moscow, where Anton received the best instruction. After numerous public appearances he went to Berlin to study under Dehn, but reversals of fortune forced him on the concert stage. He settled in St. Petersburg in 1848, where he had the good fortune to receive a court appointment. There he spent much time in composition and study. He held various positions of honor and made many concert tours, coming to America in 1872. His playing was characterized by great vital warmth, and his compositions for piano and for orchestra are played by the greatest musicians.

Ru'ble, a Russian silver coin of the value of 100 kopecks. It is the unit of Russian coinage and formerly had a value of 51 cts. in United States money.

Ru'by, a precious stone of deep red color. It is highly prized as a gem, and large rubies are more valuable than diamonds of equal size. The darker colors are carmine or blood red and wine red. Those most highly prized and known as pigeon's blood stones are found in Mandalay, Burma. Rubies are also found in India, Ceylon and Australia. A few have been found in North Carolina, but they are inferior to the Oriental rubies. Garnets of good quality are sometimes mistaken for rubies. See PRECIOUS STONES.

Ru'dolf, a lake in British East Africa, situated 200 m. n.e. of the Victoria Nyanza. It is about 185 m. long and from 20 to 35 m. wide. Recent volcanic activity is thought to have changed its contour, and the surrounding territory is barren because of the lava deposits. It was discovered by Teleki in 1888.

Ruff, a bird of the Sandpiper Family, somewhat larger than the robin. The upper parts are chestnut, spotted with black; the head and shoulders are purple, with bars of chestnut; the tail brownish, with black spots; and the wings, dark brown or black, the shafts of the feathers being white. The under parts are white, the breast having black marks. There is a ring of reddish, black-marked feathers about the neck, which the male is able to raise at will, and this gives the bird its name. The head of the male is also provided with fleshy papillæ during the breeding season. There are several females to one male, and during the breeding season the males gather in a secluded spot, generally on a little knoll, and fight furiously. The nest is made on the ground and the eggs are spotted. This bird is found in Asia and northern Europe and occasionally in the eastern part of the United States.

RUFFED GROUSE

Ruffed Grouse, a bird of the Grouse Family, so named on account of the presence of a ruff of soft, black or brown feathers on the side of the neck. This grouse is about 19 inches long, brownish above, streaked with black, gray and buff; the under parts are whitish barred with brown; the tail is reddish or grayish, crossed by several narrow bands and with a wide, black ter-

minal band. There is a tuft of glossy black feathers on the side of the neck. The 8 to 12 pale buff eggs are laid in a depression among dead leaves. The ruffed grouse is characteristic of the woods, where the males may be seen in the spring mounted on a dead log, rapidly vibrating their wings, by which they produce a drumming sound. In the South this grouse is called a pheasant, and in the North, a partridge.

Rug'by School, a celebrated English public school, founded at Rugby in 1567 by the will of Lawrence Sheriffe as a free school for the boys of Rugby and Brownsover. During the first century of its existence the school made but little progress, owing to continuous litigation between the descendants of Sheriffe and the trustees for control of the property. After the trustees were placed in full possession of the property the school began to increase in numbers and importance, but its wide reputation is due to the work of Thomas Arnold, who became head master in 1829 and continued in the position until his death in 1842. Arnold completely revolutionized the system of government and instruction. His methods were so popular and effective that they were adopted by other schools, so that under his regime was inaugurated at Rugby a system that has wrought radical changes in this class of schools throughout England. Rugby is still a classical school, but it has yielded to recent demands in the introduction of sciences and modern languages. The best description of the school under Arnold is *Tom Brown's School Days,* by Thomas Hughes, one of its most noted graduates. See ARNOLD, THOMAS.

Rum, a strong, alcoholic liquor made by distilling the drainings and skimmings obtained in making cane sugar. The material is first fermented, afterwards distilled and colored brown with caramel. The best grade is known as Jamaica rum and is produced chiefly in the West Indies and British Guiana. It is sometimes flavored with pineapple juice, and then is known as pineapple rum. The French make an inferior variety, which is called tafia.

Rump Parliament. See LONG PARLIAMENT.

Runeberg, *Roo' ni ber" y',* **Johan** (1804-1877), a Swedish poet, born in Finland. His poetry is intensely patriotic, original, classical in its simplicity and quaintly humorous. He wrote a series of poems dealing with the War of Independence of 1808, called *Ensign Ståls Stories;* also *The Grave in Perrho, King Fjalar, The Elk-Hunters, Nadeschda, Christmas Eve* and *The Kings at Salamis.*

Runes, *Roonz,* the written characters used in early times by the Teutonic tribes of northwestern Europe. There are three classes of runes, Anglo-Saxon, German and Scandinavian, but the differences in form are not striking. Numerous runes have been found inscribed on memorial stones, rings, coins, etc., in Denmark, Norway, Sweden, Germany, Iceland and certain parts of Britain. As the knowledge of these characters was confined to sorcerers and heathen priests, after the introduction of Christianity this form of writing was forbidden. The source of runes and the time of their origin are not known.

Runjit Singh, *Run jeet' Sing',* (1780-1839), maharaja of the Punjab and founder of the Sikh Kingdom. When 17 he seized the power. The ruler of Afghanistan gave him Lahore, and he himself subdued the Sikh states north of the Sutlej; but the chiefs south of the river arranged with Runjit, through the English, so that he accepted the Sutlej as his southern border. With the aid of the French and English officers, he organized his army, becoming more powerful. In 1812 he was raja; in 1819, maharaja of the Punjab; and, though defeated by the Afghans in 1836, remained supreme.

Runnymede, *Run' i meed,* or **Runnimede,** a stretch of green meadow along the right bank of the Thames, 20 m. w. of London. It is now used as a race course. The site has historic signifi-

cance because either here or on Charter Island, near the shore, King John signed the Magna Charta on June 15, 1215. See MAGNA CHARTA.

Rusk, Jeremiah McLain (1830-1893), an American soldier and statesman, born in Morgan County, Ohio. He was reared on a farm, received a common school education and in 1853 removed to Wisconsin. As major of a company of Wisconsin volunteers, he entered the army in 1862, and at the close of the Civil War he was brevetted brigadier-general. In 1871 he was elected to Congress, serving three consecutive terms; from 1882 to 1889 he was governor of Wisconsin; and he then became secretary of agriculture, exerting his remarkable ability in behalf of the farmers.

Rus'kin, John (1819-1900), an English writer and critic, born in London. His father, a Scotchman, was a prosperous wine merchant, who resolved to give his son every advantage that money could buy. He was sent to Oxford to study to become a bishop, received his B. A. at Oxford in 1842, and carried off the Newdigate prize for poetry. The following year appeared the first volume of *Modern Painters,* a book revolutionary in spirit, which aimed to reveal the superiority of Turner and modern artists over the art of the old masters. Several successive volumes on art were published, and, among the Pre-Raphaelites at least, Ruskin was received with enthusiasm. His interest in art was in 1860 directed toward other channels.

With that year, in the exact middle of his life, began his career as a social reformer. His practical experiments consisted of conducting model tenements for the working classes in London, cleaning the street crossings, mending roads, opening a tea shop to show that retail trade can be carried on honestly, founding a museum of art at Sheffield and establishing an agricultural community, the Guild of St. George, for the benefit of workmen. Despite his sincerity, most of this was a failure, for he set himself too squarely against the traditional customs and standards of men. His idealism rebelled against the introduction of railroads and factories, for they marred the beauty of the English landscape, and he repeatedly reechoed Carlyle's cry of protest against a utilitarian age. Between 1870 and 1879 he was Slade professor of art at Oxford, and was for a time more intimately connected with art interests again, but ill health caused him to retire to Brantwood, where he spent the last years of his not too happy life, writing his autobiography, the *Præterita,* inimitable among the "confessions" which great men have given to the world from time to time.

Ruskin's gospel of art is fundamentally sound in so far as he insisted on truth, nature, purity and earnestness as its essential characteristics. In political and social theories he yielded to vagaries and unsound doctrines, refusing to countenance the work of such great economists and scientists as Adam Smith, Mill, Spencer and Darwin. But as a lover of art, and above all a lover of nature, few have reached his heights or so translated into words the beauty and splendor of forest and field, river, mountain and cloud. He is a consummate master of prose that knows no classical restraint, and, yielding to his love of rhythm and beauty, his inclination to splash gorgeous colors and profusion of imagery on his pages remains uncurbed, and sentence follows sentence in melodious cadence and in endless variety of manner. The sonorous quality of these "purple patches" is the most distinctive feature of his style. His writings on art include *Modern Painters, The Seven Lamps of Architecture* and *Lectures on Architecture and Painting.* Other works, serious and fanciful, are *Unto This Last, Munera Pulveris, Fors Clavigera, Ethics of the Dust, The Crown of Wild Olive, The Queen of the Air, Sesame and Lilies, The King of the Golden River* and *Præterita.*

Rus'sell, John, FIRST EARL RUSSELL (1792-1878), an English statesman, son of the Duke of Bedford, educated at Edinburgh University. Entering Parlia-

ment in 1813, he became an active champion of Parliamentary reform in 1819. His influence with the Liberals steadily grew, and despite the fact that in 1826 he was for a time unseated for advocating Catholic emancipation, in 1828 he succeeded in effecting a partial repeal of the Corporation Act and the Test Act. Three years later he was paymaster-general under Lord Grey, and he presented to the House of Commons the first Reform Bill, becoming the recognized leader in the resulting struggle. Subsequently he was home secretary under Melbourne, a colonial secretary after 1839 and an opponent of Peel from 1841 to 1845 (See PEEL, SIR ROBERT). Following Peel's resignation in 1846, Russell headed the English cabinet for the next six years, and after that he was foreign secretary under Lord Aberdeen and colonial secretary under Lord Palmerston, resigning the latter office in July, 1855. In 1859 Lord Palmerston combined in his second ministry both Peelists and free-traders, and Russell was made foreign minister. This cabinet ruled till Palmerston's death, October, 1865, and, with few changes, under his successor, Russell, until the summer of 1866. On the failure of his bill to reform the franchise, Russell then resigned the premiership. Previously, in 1861, he had become a peer.

Russia, *Rush' a.* Before the World War Russia included all of eastern and northeastern Europe, an area of about two million square miles. In addition, the empire included an immense extent of territory in Asia, of which Siberia is the best known, stretching entirely across North Asia, a band of territory about 1700 miles in width. In addition Asiatic Russia included a large part of Turkestan. The total area in Asia being about six million square miles. As a result of the World War, the Revolution of 1917, and Civil War in Russia, no nation experienced more profound changes, affecting every department of political and social government, necessitating geographical changes as well. Finland is now an independent republic For relations that will ultimately exist between other frontier provinces of Russia and the central government, when the period of reconstruction shall have been ended, see ESTHONIA, LATVIA, LITHUANIA, UKRAINE, and SIBERIA.

SURFACE. European Russia, as one great, unbroken plain, presents a striking contrast to the surface features of western Europe with their diversity of highlands, plateaus, plains and valleys. To the existence of this gloomy, monotonous plain Russia owes her opportunity for her immense territorial expansion.

Highlands. The higher regions of the country center around the two mountain masses, the Heights of the Volga and the Heights of Central Russia. The latter have as their heighest point the plateau of the Valdai, or Valdai Hills, 1150 ft. in height, rising directly south of Petrograd. The Mountains of the Donetz, about 1225 ft. high, are south of these hills, and extend almost to the Sea of Azov. Almost parallel to the plateau of the Valdai are the Heights of the Volga, along the right bank of the river of that name. The Yaila Mountains are along the shore of the Crimea. The Ural Mountains are east of this range, rising gently from the European side and falling abruptly into Asiatic territory. The mountains, Sayan, Thian Shan and Altyn Tagh, form the southern boundary of Asiatic Russia.

Lowlands. The large plain of European Russia has an average elevation of from 300 to 600 ft. above sea level, a larger sunken plain than all other below sea level in the world. Asiatic Russia contains tundras and steppes, the Arctic region being a continuous moorland broken by swamps and lakes.

RIVERS AND LAKES. Because of the vast extent of continuous lowlands, a large number of important river basins are formed. The rivers drain immense areas, and the large amount of water has deepened their channels and made their basins permanent. The Volga is the largest river. It receives the waters of the Oka and the Kama rivers, and,

with the Ural, empties into the Caspian Sea. The Dnieper, second in size, has a basin as large as France; the Don flows into the Sea of Azov, and the Bug and the Dniester into the Black Sea. The Vistula, with its tributary, the Northern Bug, the Western Dvina and the Niemen flow into the Baltic Sea. The Petchora, Northern Dvina and the Onega are tributary to the Arctic Ocean and the White Sea.

There are a great number of lakes in Russia. Ladoga, with an area of over 7000 sq. m., is the largest, and Onega is about half the size. In glaciated sections of the northern provinces the lakes are very numerous. A large part of the low, flat country consists simply of large stretches of moorland. The Caspian Sea is practically an inland salt lake, as also is the Black Sea.

Climate. The climate of Russia is continental, and the winters are cold and the summers hot. The vast expanse of the country from north to south accounts for the diversity of temperature which exists, varying from the climate of the frozen swamps of the north to the warm regions of the vine- and olive-clad regions of the Crimea. The temperature is fairly even over the central region, as there are no mountain ranges to change the course of the winds, of which the moist north and the dry east winds are the coldest. The rivers are uniformly frozen over during the winter months, and snow covers the ground in the neighborhood of Moscow for about four months. The rainfall is sufficiently ample to insure good crops, although on the whole it is less than that of western Europe, the average precipitation per year not exceeding 20 inches.

Minerals and Mining. An ice mass from the Scandinavian Peninsula invaded the northern part of Russia during the glacial period, and evidences of its advance are still apparent in the large number of morasses and boulders that cover the land, in the changed course of streams and in the numerous lakes. Geologically, Russia stands apart from the rest of Europe, and in structure its rocks consist almost entirely of horizontal layers. Minerals are found in abundance, principally gold, silver, copper, platinum, iron, zinc, coal and salt. Lack of fuel and ineffective methods of transportation have retarded the industrial development of the country. The Donetz coal basin and areas of Ukraine fortunately contain the combination of iron and coal deposits in juxtaposition; others are less extensively worked. Gold is found in the Middle Urals and in Siberia. Platinum, to the extent of about 90 per cent of the world's supply, is obtained from the west side of the Urals. Large beds of salt exist, and a great number of the lakes contain soda, as well as salt deposits. On the Baltic coast and near Moscow are extensive peat moors, which are a valuable source of fuel. In the Crimea, porcelain clay, meerschaum and marble are valuable deposits. Caucasia has the largest productive petroleum fields in existence. The Caucasian mines also furnish to the world the bulk of its supply of manganese.

Forests and Lumber. Russia has not yet adopted a scientific method of forestry, and a great deal of wood is wasted, both for fuel and for industrial purposes. Its timber wealth is large, being surpassed only by that of Canada and the United States. More than one-third of its area is forest-clad; that of Russia proper covers an area of about 470,000,000 acres. The principal trees are larch, pines and other evergreens and a few varieties of hard wood.

Agriculture. Agriculture plays a prominent part in Russian life, as four-fifths of the population are occupied with tilling the soil. About 900,000,000 acres represent the cultivable land; of this, 225,000,000 consist of the famous black earth, the loamiest and richest wheat land in the world. Of the whole area, however, only about 240,000,000 acres are under crops, due to the slight density of the population. Cereals are the chief product, wheat, rye, oats and barley being extensively grown. Flax,

hemp, beetroot, potatoes and tobacco are raised, and the cultivation of rice is increasing in importance. The southern part of the country raises fruit trees successfully; the yield consists principally of grapes, apples, plums, apricots and other varieties. On the steppes and pasture lands the rearing of cattle is fairly significant, although little live stock is exported. Dairy products are neglected for obtaining tallow, meat and hides. In domestic economy fish is an important article of diet, by reason principally of the great number of fast days. It is necessary to import large quantities, and caviar and isinglass constitute almost the entire exported fish product.

MANUFACTURES. Within the last few decades Russia has risen from a state of almost complete dependence on European imports to one of wonderful development of home industries and relative independence of supplies from other nations. The variety of raw materials, as well as a high protective tariff, are now advancing her industrial growth very rapidly. The distilleries and the breweries occupy the first place among the industries. The manufactured products include iron and steel, machinery, flour and gristmill products, beet sugar, cotton goods, leather and articles of food. The manufacturing population is not permanent, except in the largest cities; many of these industries are represented in small workshops, and even in the homes of the workmen, and this gives rise to a condition of affairs where the men leave their farm work during the winter months and seek employment in manufacturing interests. Many villages have a distinctive population in the way of highly skilled peasant workers laboring in their own homes or village shops.

COMMERCE. Means of communication in Russia are inadequate; there are few important seaports, and the coast line is short. The rivers, however, have been canalized and good waterway transportation is maintained. In order that merchants may inspect the different wares that they wish to buy, a regular system of holding large fairs has long been in practice. The principal ones are held at Moscow, Nizhni-Novgorod, Kharkov, Poltava, Yelizavetgrad, Kursk and Irbit. The one at Nizhni-Novgorod is without a rival, and here merchants from both Europe and Asia come to bargain over the staples and exchange their goods. The principal imports are raw and half manufactured articles, such as coal, leather, chemicals, metals, silk, cotton and wool, including tea, coffee, fruit and tobacco; and manufactured goods, such as metal goods, textiles and machinery. Cereals, flour, flax and hemp, oil cake, oil grains, hides, furs, skins, naphtha and timber are exported.

Commerce is carried on principally with Germany, Great Britain and the United States. The principal seaports are on the Black and Baltic seas, the Baltic ports carrying the bulk of the sea trade with the United States and north and central Europe. Navigation on lakes, rivers and canals includes about 76,500 m. The government owns and controls about two-thirds of the mileage of the railroads. In 1906 their total mileage was 41,634. The wagon roads of the country are generally bad, due to mud in spring and autumn. The winter snows facilitate land transportation during several months of the year.

INHABITANTS AND LANGUAGE. The inhabitants of Russia belong chiefly to the Slavonic branch of the Aryan people, speaking different dialects. The Finns live in the northwest and the north; the Letto-Lithuanians, in the west; what are known as the Great Russians live in the central part; the Little Russians, Cossacks and White Russians in the southwest; the Tartars, Servians and Bulgarians in the southeast. The Kalmucks, also in the south, are of Mongolian race. In addition to the Finns in the northwest are the Mongolian tribes, the Samoyedes and the Laplanders. The Jews number several millions, and a great number of Europeans have settled permanently here.

GOVERNMENT. Until 1905 the Russian Empire was an absolute monarchy

but at that date, the revolutionary activities of the country were so pronounced, accentuated as they were by the national discontent at the conclusion of the Russo-Japanese War, that the Czar was compelled to make specious provisions for a national assembly, consisting of two branches,—The Council of the Empire, and the Duma or National Legislative Assembly. But the inertia of centuries of autocratic rule was too great to be overcome by this feeble attempt at constitutional government; and it was easy for the Czar and his ministers to reduce the national assembly to a position of minor importance, and continue with but slight changes the old autocratic regime. Beneath the surface of official life in Russia was a seething mass of discontent only awaiting a suitable occasion to overthrow the existing government and institute some form of representative government perhaps constituting a wide departure from the autocratic rule of the Czar. Such an occasion arrived in 1917 during the progress of the World War. The existing government in Russia is Soviet in form (See SOVIET), the only example of such a government ever known. It is not surprising that it has assumed a very radical form which is known as Bolshevism.

See BOLSHEVISM.

RELIGION. About 70 per cent of the population belong to the Orthodox Greek Church. Next in numbers come the Mohammedans, followed by the Roman Catholics. The Protestants are also fairly numerous; the Jews, numbering about 5,000,000, are subject to frequent persecutions.

LITERATURE. See LITERATURE, subhead *Russian Literature.*

CHIEF CITIES. The population of seven of the cities of Russia exceeds 200,000. Petrograd, the old capital, had about 1,900,000 inhabitants and ranked fifth in population among European cities.

Other towns, in the order of their size, are Moscow, Warsaw, Odessa, Lodz and Kiev.

HISTORY. Many separate Slavic tribes peopled Russia in the ninth century. They were troubled by invaders and turned for help to Rurik, a Scandinavian chief, about 850. By 862 Rurik was ruling over the united Slavs, with Novgorod as his capital. Oleg, Rurik's son, became king in 879, and removed the capital to Kiev. In time this territory came to be called Russia, from *Rous,* a name given perhaps by the Finns to the Northmen. The Greek form of Christianity was introduced by Vladimir the Great (980-1015). By the end of the 11th century Russia was on the road to a civilization equal to that of the western countries of Europe, when the blight of the Mongol invasion put an end to all progress and delayed the union of the people for centuries. The Russian princes paid tribute to the Mongolian rulers, who early showed a preference for the princes of Moscow. These princes increased in power as the Mongols grew weaker, and in 1480 Moscow refused to pay tribute any longer and killed the ambassador sent to collect it. Ivan the Terrible (1533-1584) extended the Russian power over Kazan and Astrakhan and began the annexation of Siberia. He first used the title Czar as ruler of Russia. After a period of disorder Michel Romanoff was elected to the throne in 1613 and was the founder of the present title of Russian rulers.

The customs and manners of the Orientals were still dominant, and it was not until the reign of Peter the Great (d. 1725) that a serious attempt was made to bring Russia under European influences (See PETER THE GREAT). Catherine I, Peter's wife, ruled for two years. Then followed the uneventful reigns of Peter II (1727-1730), Anna (1730-1740) and Ivan (1740-1741). In the reign of Elizabeth (1741-1762) Russia took the side of Austria in the Seven Years' War. Peter III was assassinated and succeeded by his wife, Catherine II (See CATHERINE II). Poland was divided three times during her reign, and two-thirds of the kingdom

became a part of Russia. The Crimea was also annexed in 1783, and by the war of 1787-1792 with the Turks the Russian boundary was advanced to the Dniester.

Paul I, Catherine's son, favored reform at first, but became so tyrannical that he was assassinated. He was followed by his son, Alexander I, who freed the serfs along the Baltic Sea and abolished the use of torture as a legal punishment. His brother, Nicholas I, became czar in 1825. The Crimean War began during his reign, but Alexander II brought the war to a close by the Treaty of Paris, by which Russia lost Bessarabia and the right of navigation in the Black Sea. In 1877 a war broke out with Turkey (See RUSSO-TURKISH WAR). Alexander II freed the serfs, but the agitation of the Nihilists led him to adopt a repressive policy, and he was assassinated in 1881 (See ALEXANDER II). Alexander III continued the repressive policy. The Jews were again persecuted. Alexander died in 1894 and was followed by Nicholas II, destined to be the last Czar of Russia. Russian advance in the Far East alarmed Japan and when, in spite of her promises to the contrary, Russia maintained her hold on Manchuria and attempted to make Port Arthur a second Gibraltar, Japan declared war upon her (See RUSSO-JAPANESE WAR.)

Russia considered herself the protector and natural head of the Slavonic powers, consequently when Austria declared war on Serbia in 1914 Russia at once began mobilizing her armies and the World War began. Russia was not prepared for war, but her forces compelled the dispatch to the East fronts of such a large German army that it made a very material difference in the results of the great German offense in France in 1914.

And this statement is true of the military activities of Russia for the years following. But the opening of 1917 found Russia virtually exhausted. It is thought by many that official Russia was on the verge of concluding a separate peace with the Central powers. Then came on the fateful days of the Revolution of 1917. It rapidly ran through several phases. First the Duma (then in session) seized all power, overthrew the government of the Romanoffs, forced the abdication of the Czar, and organized a provisional government, of which Kerensky became the leading figure. Then the national Workmen's and Soldiers' council (Soviet) overthrew the Duma. The slogan throughout Russia then became "All power to the Soviets" and the radical wing of the Socialist party seized power and organized the Bolshevist government. (See NICHOLAS II, BREST-LITOVSK.)

Russian Thistle. See THISTLE.

Russian Turkestan, *Toor" ke stahn'*, a region of southwestern Asiatic Russia having indefinite boundaries, but considered as extending from Chinese or Eastern, Turkestan, to the Aral Sea or even to the Caspian; it is the region once known as Independent Tartary. It contains an area of 400,770 sq. m. The region is generally one of slightly-cultivated or barren steppes, where the rainfall is insufficient to feed the lakes and rivers, which, in consequence, drain away, leaving sinks, salinas and disappearing streams. Aral Sea and its tributaries, the Syr-Darya and the Amu-Darya, are the only bodies of water of importance. Recently, irrigation projects are rendering the soil available for the production of wheat, barley, rice, sugar and fruits, and the country promises to become a less desolate region.

The Trans-Caspian Railway and some domestic roads are tending to replace the old caravan routes, but the camel continues to be the most important animal of Turkestan. The provinces of Turkestan have a general government, whose seat is Tashkent, the most important commercial city of the country. The people are chiefly Russians, Turkomans and Kirghizes. Population, 6,250,000.

Russo-Japanese War (1904-1905). In 1898 Russia gained a lease of Port Arthur from China, and she soon made

it plain that it was her plan to make herself a naval power on the Pacific. In 1903 Japan proposed that both Russia and Japan respect the rights of Korea, and when Russia refused, Japan declared war against her. The capture of Port Arthur was the chief aim of the Japanese, and a siege was begun by land and by sea. The resistance was stubborn and long-continued. All points of vantage were bravely defended. The position finally became untenable, however, and in January, 1905, the fortress was surrendered to the Japanese, with its 40,000 prisoners of war and 59 forts. In the series of engagements from Feb. 20 to March 15, 1905, the Japanese, under marshals Oyama and Nogi, won the Battle of Mukden against General Kuropatkin in the greatest engagement of modern times, the combatants numbering 700,000, and the battle front extending 80 m. On May 27, 1905, the Japanese fleet, under Admiral Togo, won a complete victory over the Russian fleet in the Sea of Japan. The war had been one of the bloodiest in history.

President Roosevelt now urged both nations to negotiate peace, and plenipotentiaries of the two governments drew up a treaty at Portsmouth, N. H., which was signed Sept. 5, 1905.

By the terms of this treaty, the Island of Sakhalin was divided between the two countries; Russia ceded her claims to Port Arthur and Dalny to Japan; relinquished her railroad in Manchuria as far as Changchun, and agreed that Japan's interests should be predominant in Korea. Manchuria was left under the control of China. Japan's power in the East became undisputed, and she greatly strengthened her standing among the nations.

Russo-Turkish War, a war between Russia and Turkey in 1877 and 1878. The underlying cause of the war was Russia's desire to extend her dominions in the Balkan Peninsula and gain an outlet to the sea through the Bosporus. The immediate occasion for hostilities was the atrocities against the Christians in Bulgaria and other Balkan provinces. These occurred in 1876 and were of such extent as to claim attention from the leading countries of Europe, but they failed to unite on any definite policy. Russia then assumed the rôle of protector of the Christians and declared war against Turkey Apr. 24, 1877. At first the Russians underestimated the strength of the enemy and suffered several defeats, but their armies soon outnumbered the Turks and they gradually advanced on Constantinople, which by January, 1878, was at their mercy. An armistice was signed on Jan. 31, and the Treaty of San Stefano, signed on March 3, ended the war. The terms of this treaty were so favorable to Russia that the other European powers were not willing to abide by it, and a congress was called to meet in Berlin to revise the treaty. See BERLIN, CONGRESS OF.

Rust, botanically, a fungus disease which does great damage to cereal crops. It is spread by millions of tiny spores, which are readily distributed and are peculiar in their method of growth. Only a part of their life is spent upon the grains which they so greatly damage, and the rest is upon widely different plants. The wheat rust, for example, lives only one season on the wheat and must then find a barberry bush upon which to pass the next stage of its life cycle. Although scientists and practical farmers have spent much effort in preventing the spread of the disease, as yet no remedy has been found. Spraying with fungicides is valueless, since the spores live within the plant and are often located within the embryo of the seed. The growing of resistant varieties of wheat and the removal of all near-by barberry shrubs or the alternate hosts proves most feasible. Early-sown and early-ripening

RUST OF WHEAT

varieties are less liable to be affected than others.

Oats, rye, wheat and barley are all affected by rusts, though of different varieties. These crops are less liable to be attacked if not planted in low moist situations, and if the soil is not treated with too much nitrogenous fertilizer. Fruit plants affected by rusts are the plum, cherry, gooseberry, raspberry and grape. The asparagus, chrysanthemum, mint, hollyhock, carnation and rose are also subject to similar disease. For treatment, consult Massee, *A Text-Book of Plant Diseases.* See FUNGICIDE.

Ruth, *Rooth,* a book of the Old Testament, a sequel to the book of *Judges.* It covers a period of ten years, during the judgeship of Deborah and Barak (See DEBORAH), and is the link connecting the period of the judges with the monarchy. The book of *Ruth* contains one of the many charming narratives of Hebrew literature, and the reply of Ruth to her mother-in-law, Naomi, when urged to return to the land of Moab, is deservedly noted for its beauty and pathos. The love story of Ruth and Boaz, characterized by simplicity and refinement, gives a pleasing picture of the customs of the times. Ruth is also of additional interest as the great grandmother of David. The date and author of the book of *Ruth* are uncertain, but it belongs, probably, to the same cycle of sacred story that is found in *Judges* and *First Samuel.* See BIBLE, subhead *The Old Testament.*

Rutile, *Roo' til,* a reddish-brown mineral occurring chiefly in veins in the older rocks in many European countries and also in America. A number of specimens found in Georgia have been used as gems. The stone is sometimes found in needlelike crystals extending through transparent quartz and forming a beautiful variety sometimes called Venus's-hairstone.

Rut'land, Vt., county seat of Rutland Co., 67 m. s.e. of Burlington, 56 m. s.w. of Montpelier, the state capital, and 6 m. from Killington Peak, one of the highest peaks of the Green Mountains. It is situated on Otter Creek and on branches of the New York Central Railroad. Rutland is the second city of the state in population. It is in an agricultural region but is well known for its extensive marble quarries and industries connected with the manufacture and shipping of marble. It is the central shipping point for "Vermont white marble" and furnishes about three-fourths of the marble quarried in the United States. There are also important manufactories of machines, engines, boilers, scales, butter and cheese, lumber and brick. Iron ore, fire clay and slate are found in the vicinity. The principal buildings are Memorial Hall and Government Building. Rutland was in the battle region of the Revolutionary War. It was situated on the Great Northern Military Road, and two forts were erected here. In 1781 it was made the county seat, and from 1784 to 1804 it was one of the state capitals. In 1886 the towns of West Rutland and Proctor were set off from Rutland. It was chartered as a city in 1892. Population in 1920, 14,954.

Rutledge, *Rut' lej,* **Edward** (1749-1800), an American patriot and statesman, born in Charleston, S. C. Completing his law studies in England, he began to practice in Charleston in 1773 and acquired fame in his profession. He worked zealously for the colonial cause and was one of the signers of the Declaration of Independence. In 1791, while in the South Carolina Legislature, he drew up the law abolishing primogeniture (See PRIMOGENITURE). At various times he served as United States senator and state governor.

Rutledge, John (1739-1800), an American statesman and jurist, born in Charleston, S. C., a brother of Edward Rutledge. Having studied law in London, he rose to eminence in his profession. Both in his native state and in Congress he worked zealously for the colonial cause, being a member of the Stamp Act Congress, of the South Carolina convention of patriots and of the First Continental Congress. In 1776

he was chairman of the convention that framed the South Carolina state constitution. He was the first governor of the new State of South Carolina, and was one of the first justices of the United States Supreme Court, which latter office he resigned to become chief justice of the South Carolina Supreme Court.

Ruysdael, *Rois' dahl,* **Jacob** (about 1625-1682), one of the greatest of Dutch landscape painters. He was born at Haarlem, where he was instructed by his uncle, Salomon Ruysdael, himself a landscape painter of repute. About 25 years of his life were spent in Amsterdam, where many of his best pictures were painted. Although a recognized master among fellow artists, he found no market for his pictures, and, after suffering all his life from poverty, died in an almshouse in his native town.

Ruysdael was a master of landscape, rendering it with unusual truthfulness and accuracy. He choose for treatment the flat scenery of Holland, with watercourses, windmills and quiet hamlets. His style is remarkable for breadth, combined with close attention to detail, warm color, interesting cloud effects and restful calm. He was equally successful in his studies of the sea. Among his greatest and best-known canvases are *View of Haarlem, Agitated Sea* and *Oak Forest* (Berlin Museum); *The Hunt, Ford in a Wood, Castle of Bentheim* (Dresden Gallery); and numerous others in various European galleries.

Ry'an, Abram Joseph (1839-1886), a Roman Catholic poet and priest, born in Norfolk, Va. His boyhood was spent in preparation for the priesthood, and during the fifties he studied at the seminary in Niagara, N. Y. He was ordained some few years before 1861, and when the war between the North and South broke out, he enlisted as chaplain in the Southern ranks. After the war, Father Ryan lived in several of the larger Southern cities. It was during this period of his life that he wrote the poems that so endeared him to the Southern heart. The last years of his life were spent in lecturing. He died in Louisville, Ky. His religious poems show a deep conviction of the injustice of the Civil War to the South, and a somewhat unkindly feeling toward the North. When, however, the people of the North so nobly aided the victims of the yellow fever epidemic of 1878, Father Ryan's feelings were changed to gratitude, and thenceforth his best efforts were bent towards cementing the friendship of the two sections. The best expression of this is his poem, *Reunited.* His publications include *The Conquered Banner, and Other Poems; Poems, Patriotic, Religious, and Miscellaneous;* and *A Crown for Our Queen.*

Ryan, Patrick John (1831-1911), a Roman Catholic prelate, born at Thurles, Ireland. His earliest instruction was at the school of the Christian Brothers in Thurles; but, deciding to become a missionary, he entered the Vincentian College at Castleknock in 1845 and two years later went to St. Patrick's College, Carlow. Here he received a subdeaconship, and on coming to St. Louis, Mo., though still under canonical age, he was ordained a priest in 1853. In 1868 he visited with Archbishop Kenrick in Italy, Germany, France and Ireland. While in Rome, Pope Pius IX signally honored him by requesting that he preach a Lenten course of sermons in English. In 1872 Father Ryan was elected Coadjutor Archbishop of St. Louis, and so successful was he, that in 1884 he was consecrated Archbishop of Philadelphia.

Eminently tactful, Archbishop Ryan was distinguished for his wit and eloquence, and lectured much, especially on modern skepticism. He was a potent local factor in settling labor disputes, took great interest in the negro problem, accepted Ex-President Roosevelt's appointment as member of the Indian Commission, and, until his death, was a member of the Executive Board of Catholic Indian Missions.

Rye, an important cereal and a member of the Grass Family. It is grown in cool or temperate climates but does not thrive in as northerly latitudes as does

barley. It has long been cultivated in northern Europe, where it has been used as the source of the flour from which black bread is made. The plant itself is a tall one, having narrow, ribbonlike leaves of blue-green color. The flowers grow in a spike and are followed by hard, oval grains slightly bearded at one end. There are two principal species, winter and spring rye; the former is planted in the autumn and ripens in June; the latter is sown in the spring. The grain is ground into flour, made into bran and shorts. The entire plant is used for fodder and the long straws are of value in the manufacture of bricks, mattresses, baskets, paper and hats. Russia is the greatest rye-producing country, the crop for 1915 being 880,000,000 bushels. In the United States for the year of 1918 the yield was 89,103,000 bushels. Rye is readily attacked by a fungus disease known as ergot, which renders it poisonous to cattle. See ERGOT.

Rye House Plot, a plan formed in 1683 by a few Whigs, to assassinate Charles II and place the Duke of Monmouth on the throne. The name was given because the place chosen for the murder was to be the Rye House, a farm near Newmarket. The plot was discovered, and Algernon Sidney, Lord Russell and other leading Whigs were executed, and many others were punished.

Ryswick, *Riz' wik,* **Peace of,** a treaty negotiated between Louis XIV and the Grand Alliance in 1697. It was really between France and England on one hand and Spain and Holland on the other. It ended a nine years' war between Louis XIV and the Grand Alliance and practically restored all boundaries both in Europe and America as they were before the war. The chief significance of the treaty lay in the fact that it was a check upon the ambition of Louis XIV, whose power began to decline from that time.

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SAB'BATH, the day appointed by the Law of Moses as a period of rest and worship, commemorating the story of the creation, when God, having brought forth the world in six days, rested on the seventh. The term *Sabbath* differs from *Sunday* in that the former names the institution, the latter, the day now observed by most Christian sects as sacred. Saturday, the seventh day of the week, is observed as the Sabbath by the Jews and a few minor Christian bodies.

Sa'bin, Henry (1829-), an American educator, born at Pomfret, Conn. He graduated at Amherst in 1852. After teaching in Connecticut, New Jersey, Illinois and Iowa, he served as superintendent of public instruction in Iowa from 1888 to 1892, and from 1894 to 1898. He was president of the Teachers' Association of that state in 1878, and of the department of superintendence of the National Education Association in 1893. In 1895 he was chairman of the committee of 12 on rural schools, whose report to that body marked the beginning of a new era in the educational policy of the country. His influence on education in the Mississippi Valley has been very great. He wrote *Common Sense Didactics.*

Sabine, *Sa been',* **River,** a river of the United States. It rises near the northern boundary of Texas, flows southeastward, then southward into the Gulf of Mexico. It forms about two-thirds of the western boundary of Louisiana. Its length is about 500 m. and it is navigable in the lower part of its course.

Sa'bines, an ancient people, neighbors of the Romans. The legend concerning them is that the soldiers of Romulus seized the daughters of the Sabines as they were watching the festivities in the city. War broke out between the two peoples, but the stolen Sabine women rushed into the midst of the battle to plead with their husbands and relatives to give up the fight. After the two people were reconciled the Sabines settled on the Quirinal Hill and were received as equals by the Romans.

Sable. See MARTEN.

Sac, *Sak,* or **Sauk,** a tribe of North American Indians belonging to the Algonquian family. They formerly dwelt along the Rock River in Illinois and in the northeastern part of Iowa and southwestern part of Wisconsin. In 1760 the Foxes, an allied tribe, united with them. In 1832, under the lead of Black Hawk, they resisted the whites, with whom they had signed a treaty ceding all their lands east of the Mississippi. They were defeated and obliged to move farther west. Subsequently some of them returned to Iowa and purchased land. They now number less than 1000. See BLACK HAWK.

Saccharine, *Sak' a rin,* a white crystalline compound obtained from coal tar by distillation with other methods of separation. Saccharine is soluble in hot water, alcohol and ether, and melts at 220° F. It is several hundred times stronger in sweetening power than cane sugar, and for this reason it is extensively used by manufacturers of confectionery, especially in Germany. It is sometimes recommended in diseases like diabetes, where sugar is prohibited. The term *saccharine* has also an extended use as designating the amount of sweetening in cane sugar, honey, glucose, etc. See GLUCOSE; SUGAR.

Sachs, *Zahks,* **Hans** (1494-1576), a German poet and dramatist, born in Nuremberg. He adopted his father's trade of shoemaking, after having received a classical education, and in 1511, as a journeyman, began to traverse various parts of Germany, working at his last and becoming, because of his poetry and

song, the chief of the mastersingers. His hymns were widely used in the cause of the Reformation and were characterized by freedom from any display of learning, despite the fact that he aimed to make them instructive. The waning interest in his verse, following the death of Sachs, was revived by Goethe, who recognized in this early singer's work its real merit. See MASTERSINGER.

Sack'etts Harbor, Battle of, an engagement of the War of 1812, fought at Sacketts Harbor, N. Y., on Black River Bay, Lake Ontario, May 29, 1813. Nine vessels with 1000 troops aboard, under Sir George Prevost, governor-general of Canada, attacked the American fort under Gen. Jacob Brown. The Americans were victorious, losing in killed and wounded about 135 men, while the British lost almost twice as many. Early in the engagement, however, fearing that they were defeated, the Americans had fired their storehouse, thereby destroying $500,000 worth of supplies. Ft. Tompkins Park commemorates the scene of this battle.

Sack'ville, Thomas (1536-1608), an English poet and statesman, born at Buckhurst, Sussex. With Thomas Norton he wrote the first English tragedy in blank verse, *Gorboduc,* earlier known as *Ferrex and Porrex.* It deals with British legend, and is characterized by stately style and lack of plot. Sackville was created Earl of Dorset in 1600. His other works include the *Induction* and the *Complaint of the Duke of Buckingham.*

Saco, *Saw' ko,* **Me.,** a city of York Co., 14 m. s.w. of Portland, on the Saco River, 6 m. from its mouth, 4 m. from the Atlantic Ocean, and on the Boston & Maine Railroad. It is connected by four bridges with Biddeford, and other localities on the opposite side of the river. The city has an extensive coast trade in cotton goods and ships considerable farm produce. The chief manufacturing establishments are boot and shoe factories, cotton and lumber mills and manufactories of belting, brushes, brick, carriages and other articles. Old Orchard Beach, a popular seaside resort, is four miles distant. The principal public institutions are Thornton Academy and York Institute. There is also a home for the aged. The town was settled about 1631, but the site of Saco was separately incorporated as Pepperellboro in 1762. The name was changed to Saco in 1805. It received a city charter in 1867. Population in 1920, 6817.

Sacrament, *Sak' ra ment,* a holy rite or symbol of the Church, instituted by Christ for the purpose of sanctification. The Council of Trent decreed for Roman Catholics a belief in seven sacraments; namely, baptism, confirmation, Holy Eucharist, penance, extreme unction, holy orders and matrimony. These are also observed by the High Anglican Church. Protestant churches observe baptism and the Eucharist, or Lord's Supper. See ROMAN CATHOLIC CHURCH.

Sac"ramen'to, Cal., a city, port of entry, capital of the state and county seat of Sacramento Co., on the Sacramento River, 61 m. from its mouth, 90 m. n.e. of San Francisco and on the Southern Pacific and the Western Pacific railroads. The city is attractively built on a broad, low plain about 30 ft. above sea level. Levees have been built along the Sacramento and the American rivers, the latter being a tributary to the Sacramento. The city has excellent interurban electric service: the Northern Electric extends to Chico, about 90 m. distant; the Central California Traction, to Stockton and thence into the San Joaquin Valley; and the Vallejo & Northern, to the deep-water port at Vallejo. Several lines of steamers also connect the city with San Francisco and points north and south. Sacramento is the center of all the commerce of the great Valley of California, and there is a large wholesale trade. The city is situated in one of the greatest fruit-growing regions of the state, 75 per cent of the deciduous fruits grown in the state being grown within a radius of 45 m. The Tokay grape yields abundantly, and almonds, olives, English walnuts and sugar beets are cultivated.

Parks and Boulevards. The streets of Sacramento are parked with shade trees of numerous varieties. There are many miles of attractive homes with well-kept lawns and flowers. The park system includes Capitol, Ft. Sutter, South Side and McKinley parks. Capitol Park contains 335 varieties of trees and shrubs brought from nearly every corner of the world.

Public Buildings. The most important building is the capitol, which stands in a park of 35 acres and is one of the most beautiful and commodious capitol buildings in the United States. It was completed in 1874 at a cost of nearly $3,000,000. Other prominent buildings include a Federal Building, city hall, courthouse, county hospital, a number of libraries and the Crocker Art Gallery, presented to the city in 1885 by Mrs. Margaret Crocker, widow of Judge E. B. Crocker, one of Sacramento's most noted citizens. In connection with the gallery is the School of Design, attended by pupils from all parts of the state. Among the numerous handsome churches are Catholic and Protestant Episcopal cathedrals.

Institutions. The educational institutions include the College of the Christian Brothers, St. Joseph's and Howe's academies, a business college and a handsome high school costing $300,000. Other institutions include the Southern Pacific Railway, the Mater Misericordiæ, the Wentworth and the city hospitals; Stanford-Lathrop Memorial Home for friendless girls; the Peniel Rescue Home; Sisters of Mercy Home; the Marguerite Home for old ladies; and an orphans' home.

Industries. The manufacturing interests of the city are large and varied. There are extensive manufactories of flour, lumber, furniture, harness and saddlery, soft drinks and cigars, and important establishments for fruit and vegetable canning and packed meats. The main shops of the Western Pacific and Southern Pacific railroads are located here, and the city contains the state printing establishment in which the textbooks for the entire school system of the state, as well as other books, are printed. A $750,000 fruit-canning and packing establishment was completed in 1913.

History. John Augustus Sutter obtained a grant of a large tract of land in 1839 and built a fort which he named New Helvetia. This was the first point in California reached by miners from the East in 1848 after the discovery of gold. The historic fortress has been restored and stands in a handsome park. The first sale of town lots was in January, 1849, and the place called Sacramento. The great richness of the placer mines caused the town to grow with amazing rapidity. Sacramento became the state capital in 1854. The city was incorporated in 1863, and a new charter granted in 1893. Population in 1920, U. S. Census, 65,908.

Sacramento River, the largest river of California. It rises in the northern part of the state in Goose Lake, flows southward and enters Suisun Bay on the boundary between Contra Costa and Solano counties. It is about 600 m. long. In some parts of its course its waters are extensively used for irrigation.

Sa'cred Fig. See Peepul.

Sacred I'bis. See Ibis.

Sacrifice, *Sak' ri fise,* a gift, which, being consumed, is offered a higher power as a token of thanksgiving, repentance or conciliation. The term refers both to the gift and the rite. Among the ancients sacrifices were frequently offered to allay the wrath of a menacing deity or to counteract his malicious purpose. The sacrifices of the Jews in Bible times were an essential feature of their religion, and full details of these are found in the book of *Leviticus.* The atonement theory accepted by Christians is that Christ was offered as a sacrifice for the sins of the world, which has made no longer necessary the ancient Jewish rites.

Sad'dle, a contrivance providing a seat on an animal's back, or part of a harness. In ancient times the rider used a saddle in the form of a box for the back of the camel, which was used both

for riding and as a packsaddle to strap goods on by means of cords. The American Indian rode his horse usually bareback, but sometimes fashioned a saddle from buckskin. It was held in place by strips of rawhide, and was used more to pack things on with than for his own comfort. During the Crusades coverings for the horse's back became highly ornamental and were often richly decorated. The modern riding saddle consists of a wooden tree covered with pigskin, forming the seat, to which is attached leather flaps with stirrups suspended to stirrup leathers; also a belly band, or girth, which is buckled around the animal's body to keep the saddle in place. A saddle with one stirrup and a horn, by which a woman sits sideways instead of astride, is known as a side-saddle. Military and racing saddles, as well as those of cattlemen, are modifications of the standard saddle. In a harness the saddle usually supports the shafts of a vehicle. See HARNESS.

Sadducees, *Sad' u seez,* a Jewish party supposed to be named from *tsedek* (righteousness) or from Zadok, a president of the Sanhedrin (200-170 B. C.). More conservative than the Pharisees, they denied the authority of all tradition after Moses, they disbelieved the existence of spiritual beings, the immortality of the soul and the resurrection of the body, and were skeptical concerning the miraculous and supernatural. They were more aristocratic than the Pharisees, and, possessing a larger share of the wealth, they generally held the highest offices. Annas and Caiaphas were Sadducees. The party disappeared after the destruction of Jerusalem in 70 A. D. See PHARISEES.

Sadowa, *Sah' do vah,* **Battle of** (July 3, 1866), a battle between the Prussians and Austrians near the village of Königgrätz, in Bohemia. The battle was hotly contested but the Prussians, commanded by the Crown Prince of Prussia and Prince Frederick Charles, defeated the Austrians under Benedek. This battle is also called the Battle of Königgrätz. The Austrians lost 22,000 prisoners and 20,900 were killed or wounded, while the Prussians' killed or wounded numbered only 8794. This was the decisive battle of the Seven Weeks' War. See SEVEN WEEKS' WAR.

Safe, a movable receptacle in the form of a box constructed of steel for the storing of valuables, such as money, jewelry and documents. The safe is a modern improvement on the strong box, or oaken chest, of ancient times. Until the 17th century even kings and the wealthy people had no better means of safe-keeping their valuables than wooden chests, bound in iron and rawhide. The modern fireproof safe is built with a space between the inner and outer plates of steel; this space is filled either with a nonconductor of heat, such as fire clay, asbestos, mica or chalk, or some material like alum, which gives off moisture and makes steam by being heated. Burglar-proof safes are sometimes made in special forms, and they are always constructed of hardened steel, so as to resist the tools of the burglar. Other patterns have their walls constructed of alternate layers of hard and soft steel. Such safes are not fireproof, but are put in buildings that are so considered.

For financial institutions safes in the form of large vaults, with very thick walls built of stone, cement and concrete, are constructed within the building, and are fireproof. The inside linings of these, together with the outer doors, are made of hardened steel similar to armor plate, and all openings are close fitting, so as to prevent the use of liquid explosives. These vaults are usually provided with time locks, a device similar to a combination, keyless lock, but so arranged with timepieces and clock mechanisms that the unlocking bolts are capable of being moved only at a given time for which they have been previously set. Movable safes are usually fitted with combination locks. See LOCK.

Safe'ty Lamp, a special form of lamp used for illuminating coal mines, and at the same time preventing the ex-

plosion of inflammable gases, like fire damp. The first safety lamp was invented by Sir Humphry Davy in 1815, and all lamps of this character usually bear his name, although many improvements have since been added. It consists of an ordinary oil lamp, around which is a casing of wire netting, which is arranged to be locked after the lamp is lighted. Subsequently George Stephenson added the glass globe or chimney to it and provided a perforated ring at the bottom for the entrance of air. Davy found that a flame will not pass through the meshes of fine wire netting, and that if a lamp be taken into a mine where there are explosive gases, they will enter the chamber within the wire netting, but the flame will not pass outside. When the miner sees the lamp getting hot he prudently goes to another part of the mine. See FIRE DAMP.

An electric safety lamp recently invented is extensively used in England and Germany. The current for the incandescent light is obtained from a storage battery located in the bottom of the lamp frame. The batteries are easily replaced when exhausted, and the light is stronger than that of the old-style lamp.

Safety Valve, a device fitted to a steam boiler for relieving it of too great a strain by allowing steam to escape. It consists of a hollow body, whose base is screwed or bolted to the boiler and whose top is provided with a beveled, circular hole or seat, into which fits a circular lid or valve similarly beveled. When the valve is seated and held down by means of a lever and weight, or by a spring, there is no escape of steam. When the pressure of steam becomes greater than the pressure which holds the valve down, the valve is unseated, or opens, and the escaping steam brings down the pressure to that point which the boiler is figured to carry with safety. Those operated by coiled springs are used chiefly on locomotives, steam fire engines and steam traction engines, as well as on most portable boilers, and are known as "pop" safety valves. See BOILER.

Saf'fron, a name given to a genus of plants of the Iris Family. There are a number of species, many of which are common in the Mediterranean regions, and many in the United States. In America the saffron is frequently called the fall crocus. The plant grows from a bulb which produces both flower and leaves. When the flower blooms, the plant is low, much resembling the spring crocus, but after the blossom has fallen, the stem lengthens to allow the seeds to ripen in the sun. The tube of the flower is so long that it seems to spring almost directly from the bulb, and it is white or purple in color. The stigmas, or knobs at the tops of the pistils, are of deep orange color, and from them is derived the commercial saffron used as a coloring matter for candy, liquors, medicines and foods. Four thousand of the flowers are required to produce one ounce of commercial saffron. Saffron is cultivated chiefly in France, Italy and Spain, where it flowers in September. The so-called American saffron is a member of the Composite Family and is also used, though not so commonly, as a dye and a medicine.

Saga, *Sah' ga,* among the Icelanders the name of the most important of prose epics. Sagas are of three kinds, historical, mythical and romantic. The first group gives a faithful picture of Icelandic life from 874 to 1030 and an account of the kings, particularly the Norwegian. The second, commingling fact and fiction, is based on some legend or hero exploit. The third consists of imitations and adaptations drawn from Latin, French and German sources. Some of the Sagas, which at first were given orally, repeated and thus preserved from generation to generation, were written down in the 12th century. By the 15th most of the others had been taken down and arranged in a form often approaching grandeur. Many were interspersed with poetry. As a rule, the best Sagas came from western Iceland. Among the important Sagas are the *Njálssaga,* the *Laxdœlasaga,* the *Egilssaga* and the *Grettissaga.*

Sage, a garden herb of the Mint Family, growing wild in tropical and semitropical countries, but cultivated in America for its aromatic stems, leaves and flowers. Sages are square-stemmed, heavy plants, growing from one to four feet in height. The leaves are opposite each other on the stem, and are undivided, though their margins are often wavy. The flowers occur in clusters. The petals are united into a two-lipped tube, the upper lip being divided into two lips and the lower into three. The pistils of one flower are fertilized by the stamens of another (See CROSS-FERTILIZATION). Garden sage is used for flavoring and for medicine. It has blue flowers.

Sage, Russell (1816-1906), an American capitalist, born in Shenandoah, N. Y. He began his business life in Troy, occupying while there several public positions of minor importance. From 1853 to 1857 he was a member of Congress, elected by the Whig Party. Subsequently he removed to New York City, where he became interested in railroads. He was also a director in several banks and other corporations. He became very wealthy and upon his death left his fortune to his wife, who has used it most generously for the uplift of mankind. In 1907 she established the Russell Sage Foundation, devoting $10,000,000 to the betterment of conditions in the United States. Its purpose is to remove the causes of poverty.

Sagebrush, a small heavy shrub of the Composite Family, which grows on the dry alkali plains of the West. The stems are straight, stiff and very leafy, but the leaves are small and wedge-shaped and grow close to the stem. The flowers grow in bushes at the tops of the branches. They are composed of tiny florets growing upon a small disk. Each cluster produces both staminate and pistillate flowers. Sagebrush is one of the chief forms of vegetation of desert regions. A variety of grass often grows beneath its bushy stems that is very nutritious for cattle. Sagebrush is the state emblem of Nevada.

Sage Grouse, a social bird of the Grouse Family. It is a large bird about 30 inches in length, having the upper parts mottled grayish, irregularly spotted with brownish-black; the breast has black feathers, the tips of which become worn off during the mating season, changing the breast to white. In the breeding season the male is provided with tufts of black and white feathers on the shoulders, under which a distensible air sac is located. The female is smaller and lacks the long tail, air sac and shoulder feathers of the male, and has a white throat. The nest is frequently placed under a sage brush and is simply an unlined hollow in which the seven to nine brown-spotted eggs are laid. The sage grouse is a familiar bird on the Western plains, where it is considered a tempting game bird.

Saghalien, *Sah″ gah lyen′.* See SAKHALIN, *Sa″ ka lyeen′.*

Sag′inaw, Mich., a city and county seat of Saginaw Co., about 100 m. n.w. of Detroit and 65 m. n.e. of Lansing, on the Saginaw River about 16 m. from its entrance into Saginaw Bay, at the head of deep-water navigation, and on the Pere Marquette, the Grand Trunk, the Michigan Central and other railroads. The city is traversed by an excellent street-car system, and a number of interurban lines reach out to Detroit and Bay City and other neighboring towns and cities. Saginaw is the third city in the state in population and covers an area of about 13 sq. m. The streets are finely paved and shaded and notable for their width. Hoyt, Riverside and Rust are noteworthy parks.

Among the public buildings are the courthouse, city hall, Masonic Temple, Federal Building, an auditorium, armory, banks, theaters and fine business houses. There are about 46 churches and a number of missions. The educational institutions include the Germania Institute, Saginaw Valley Medical College, a free manual-training school, Hoyt Reference and public libraries, a number of high schools, public and parochial schools and business colleges. Among the benevolent

and charitable institutions are the Saginaw, St. Mary's and Woman's hospitals, Home for the Friendless and St. Vincent's Orphan Home.

Saginaw has extensive lumbering interests. Coal mining is an important industry, a number of mines being located within the municipal limits. The city contains large beet-sugar factories, railroad shops, plate-glass works, furniture factories, engine and boiler works, planing mills, salt works, lumber-assorting yards, tanneries, graphite works, flour mills, brickyards and other plants.

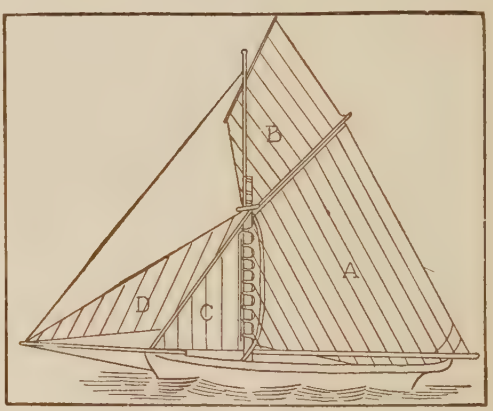
The first settlement was made on the west bank of the river in 1815 and named Saginaw City. A settlement was also made on the east side of the river in 1849 and called East Saginaw. In 1890 these towns were consolidated. Population in 1920, U. S. census, 61,903.

Sagittarius, *Saj" it ta' ri us,* **The Archer,** the ninth sign of the zodiac and a southern constellation which the ancients supposed to represent a Centaur shooting an arrow. The sun enters Sagittarius about the 22nd of November. The sign is ♐, which represents the arrow of the archer.

Sa'go, a white, starchy flour produced from the pith of several trees of the Cycad Family. These trees are often wrongly called sago palms but they are palmlike only in external characteristics. The plant has a straight, cylindrical stem, which bears upon its summit a crown of graceful feathery leaves, and in the center of these a huge, stiff cone of staminate, or stamen-bearing, flowers. Other flowers, which are to produce the fruit, grow in small clusters at the tip of the stem. The sago, or sago meal, is prepared by grinding and whitening the pith and mixing it with water.

Saguenay, *Sag" e na',* **River,** a river situated in Quebec, and one of the six important affluents of the St. Lawrence. It rises in Lake St. John or in the headwaters of large rivers flowing into it, and flows southeast, emptying into the St. Lawrence 120 m. northeast of Quebec. It is about 110 m. long and from ¾ to 2 m. wide, flowing between high, perpendicular cliffs noted for their magnificent scenery. The depth of the channel averages about 500 ft. and in some places exceeds 2000 ft. It is navigable for the largest ships as far as Ha Ha Bay and for small steamers to Chicoutimi. Tadousac at its mouth is the oldest European trading post in Canada and is a popular watering place.

Sail, usually a piece of canvas or other cloth spread to the wind for the purpose of propelling vessels through the water. The canvas, consisting of several breadths, is sewed together with a double seam at the borders, and edged



SAILS

all around with cords called boltropes. A sail extended by a yard hung in the middle is termed a square sail; a sail set upon a gaff, boom or stag, so as to hang more or less in the direction of the vessel's length, is known as a fore or aft sail. The head of a sail is the upper part; the foot, the lower part; and the leeches are the sides. The two lower corners of a square sail are called clues, and are kept extended by ropes, termed sheets. Sails take their names partly from the mast, yard or stay upon which they are set; thus, the mainsail, the main topsail and the main topgallant sail, are respectively the sails on the mainmast, the main topmast and the main topgallant mast. Referring to the diagram, A is the mainsail; B, the gaff topsail; C, the foresail; and D, the jib.

Saint Albans, *Sante Awl' banz,* **Vt.,** county seat of Franklin Co., 45 m. n.w. of Montpelier, the capital of the state, 30 m. n.e. of Burlington and 3 m. from Lake Champlain, on the Central Vermont Railway. The city is on a plain about 390 ft. above sea level. The scenery is picturesque; the Green Mountains may be seen on the east and the Adirondacks on the west. St. Albans is noted as the center of large dairying interests and has a creamery, condensed-milk factory, cotton mills and manufactories of iron and steel bridge work, iron roofing, overalls, furniture and farm implements. The shops of the Central Vermont Railway are located here. The city contains a hospital, Warner Home for Little Wanderers, Villa Barlow Convent and St. Mary's Academy. The town was permanently settled in 1786. On Oct. 19, 1864, it was raided by a band of Confederates who entered the United States from Canada. In 1866 a party of Fenians started from St. Albans to attack Canada, and later United States troops were stationed here, under General Meade, to prevent further acts of hostility against Great Britain. It received a city charter in 1897. Population in 1910, 6381. In 1920, 7582.

Saint Au'gustine, Fla., a city and the county seat of St. John Co., 37 m. s.e. of Jacksonville, on Matanzas Bay and on the Florida East Coast Railway and the Florida East Coast Canal, an inland waterway from the St. Johns River to the Florida Keys. It lies in a region of semitropical vegetation, remarkable for beautiful scenery. Fruits and vegetables are produced in abundance and shipped to markets farther north. Some tobacco is grown, and fishing and oyster canning are among the principal industries.

St. Augustine is the oldest city in the United States and has many interesting relics connected with its early history. Of these, Ft. Marion (formerly Ft. San Marco, begun in 1656 and finished in 1756) and the ruins of the old wall, in the northern part of the city, erected by early settlers as a protection against the Indians, are of chief importance. There are many old residences, and an interesting feature is the narrowness of the streets. Beginning at the fort and extending southward is a broad sea wall (modern), a delightful promenade, constructed by the Federal Government.

At the southern extremity of this wall is St. Francis Barracks, built upon the first story of an ancient Spanish convent; and near the barracks is the Flagler Hospital. The Cathedral was built in 1791. The United States customhouse and post office on the Plaza de la Constitucion are the reconstructed palace of the governor. Other features of interest are the Wilson Free Public Library, the municipal buildings, the Museum of the Institute of Natural Sciences, St. Joseph's Academy and the Florida State Institute for the Deaf and Dumb. St. Augustine is a famous winter resort, its mild climate (the mean annual temperature is 70°) attracting about 25,000 visitors annually. There are numerous fine hotels, the most magnificent of which is the Ponce de Leon, erected at a cost of $3,000,000. On Anastasia Island, across the bay from St. Augustine, is a lighthouse; here also are quarries of coquina, a shell formation suitable for building material.

St. Augustine was founded by Spanish colonists under Don Pedro Menendez de Aviles, who reached the site Aug. 28 (St. Augustine's Day), 1565, and erected a fort. In 1586 St. Augustine was burned by Sir Francis Drake and in 1665 was sacked by Capt. John Davis, an English freebooter. In the early years of its history it suffered from several attacks due to the chronic hostilities between the Spanish and English colonists. A Spanish force from St. Augustine attacked the English settlements at Port Royal in 1681. St. Augustine was attacked (and partly burned) in 1702 and again in 1704 by Governor Moore of South Carolina; and in 1743 it was besieged by Gen. J. E. Oglethorpe of Georgia. It passed into English hands in 1763 when Florida was ceded to England; and during the American Revolution it was used as a military station. It

reverted to Spain again in 1783. In 1821 St. Augustine, with the rest of Florida, became a part of the United States. It was the scene of two conflicts of the Civil War, and was twice taken by the Federals. Population in 1920, 6192.

Saint Bernard', a large breed of spaniels whose name and history connect them inseparably with the Monastery of Mount St. Bernard in the Alps. The St. Bernard is probably the largest of all dogs; it has a massive head, pendulous ears and an extremely sagacious expression. Its body is built for strength, with powerful shoulders, large limbs and a broad back. The tail is long. In color St. Bernards are white with irregular, tawny marks. There are two chief varieties: one has a shaggy coat; the other, a smooth one.

The Monastery of Mount St. Bernard is situated near one of the most dangerous passes of the Alps and one constantly traversed by Italian workmen. Here the monks breed and train these powerful dogs, which aid them in their work of rescue. The dogs are sent out each day to test the ice-bridged chasms, snow-broadened slopes and dangerous glaciers. Their scent is especially keen and they can discover a body buried many feet beneath the snow. Such a half-frozen traveler, they dig from the snow, attempt to resuscitate and at the same time, by means of prolonged howling, give notice that they have found someone who needs assistance. Generally the monks tie about the neck of the dog a flask of brandy, for the use of the traveler. The number of lives saved by these noble monks and their faithful dogs cannot be estimated, and to both is due the respect deserved by those who willingly lay down their lives for the sake of the friend and of the passing stranger.

Saint Bernard, Pass of, an Alpine mountain pass in Canton Valais, Switzerland, east of Mont Blanc and 8110 ft. above the sea. It is on the mountain road leading from Martigny, Switzerland, to Aosta, Piedmont, and connects the valleys of the Dora Baltea and the Rhône. Near the summit of the pass, on the borders of a little lake that freezes over even in the summer time, is the famous hospice known as the Monastery of St. Bernard. From 20,000 to 25,000 guests visit it annually. It was founded in 962 by St. Bernard de Menthon, chiefly for the purpose of rescuing travelers lost in the snow on their journey to Rome. Next to the Etna Observatory, it is the highest inhabited spot in Europe.

Saint Cath'erines, a city of Canada in the Province of Ontario, on Lake Ontario and the Welland Canal and on the Canadian Pacific and other railways, 71 m. s.e. of Toronto. It is the center of the Niagara fruit belt and is near the Saline Springs, noted for their curative powers. The city is the seat of the Bishop Ridley College. The leading industrial establishments are paper, flour, planing and saw mills, canning factories, metal works, a tannery and manufactories of knit goods, builders' supplies, haircloth, wine, thrashing machines, saws, agricultural hand tools, mince-meat machines and knives. Population in 1911, 12,484.

Saint Charles, Mo., a city and the county seat of St. Charles Co., about 23 m. n.w. of St. Louis, on the Missouri River, about 20 m. from its mouth, and on the Wabash, the Missouri, Kansas & Texas and other railroads. An electric railway connects the city with St. Louis, and a steel railway bridge, 6535 ft. long, and a highway bridge give access to the opposite side of the river. The country about St. Charles is exceptionally fertile and produces a large yield of wheat. The industrial activities of the town are of importance. One of the largest car factories in the United States is located here, and there are, among other industrial establishments, tobacco factories, grain elevators, a foundry, machine shops and manufactories of wagons, buggies, shoes, flour, brick and tile. The principal articles of trade are tobacco, corn, limestone and farm and factory products. At St. Charles is located Lindenwood Female College (Presbyterian), St. Charles Military

College (Methodist Episcopal), founded in 1837, and the Academy of the Sacred Heart. Other institutions are the Emmaus Asylum for Epileptics and St. Joseph's Hospital. The first settlement on the site of St. Charles was made by the French in 1769. Under the territorial law of 1809 the place was organized as a village and in 1849 was chartered as a city. Population in 1920, 8503.

Saint Clair', Arthur (1734-1818), an American soldier, born in Scotland. He was educated at the University of Edinburgh, studied medicine, joined the British army as ensign and in 1758 came to America. During the French and Indian War he fought at Louisburg under Amherst and at Quebec under Wolfe, but in 1762 he left the army and engaged in manufacturing. He was head of the Cincinnati Society of his state and held many civil offices until the Revolution, when he fought at Trenton and Princeton, becoming major-general in 1777. He commanded at Ticonderoga, which he evacuated to Burgoyne. For this he was court-martialed and acquitted, but superseded; nevertheless he remained in the army as a volunteer and later distinguished himself under Greene in the South. St. Clair was a member of Congress in 1785-1787 and its president in the latter year; in 1789 he was made the first governor of the Northwest Territory, and on Nov. 4, 1791, while leading an expedition against the Miami Indians, was surprised and completely defeated in a bloody rout. Upon investigation he was exonerated, but he was superseded by Anthony Wayne. He died in obscurity and want.

Saint Clair, Lake, a lake between the Province of Ontario and the State of Michigan. It is 29 m. long and 24 m. wide in its widest place. It is really an expansion of the St. Clair River and merges into the Detroit River at its southern extremity. The lake contains numerous islands, on some of which are beautiful summer homes. The lake has been canalized to make it navigable for the large lake steamers.

Saint Cloud, Minn., a city and the county seat of Stearns Co., about 65 m. n.w. of Minneapolis, on the Mississippi River and on the Great Northern, the Northern Pacific and other railroads. The town is built on both sides of the Mississippi, about two miles below the mouth of the Sauk River, and lies partly in Benton and partly in Stearns counties. It is in the midst of a grain and stock-raising district, and is in the immediate vicinity of vast deposits of gray and red granite. The rapids of the Mississippi furnish abundant water power, and the leading manufactures are flour, barrels, wagons, iron and lumber products and brick. There are woodworking factories, machine and railroad shops, stockyards, foundries and grain elevators. At St. Cloud are located a state normal school and the Minnesota State Reformatory. Other notable features are St. Raphael's Hospital (Roman Catholic), St. Joseph's Home for the Aged, a Catholic cathedral, a Federal Building, a Carnegie library and St. Clotilda's Academy of Music. St. Cloud, called the "Granite City," was settled in 1852, incorporated as a village in 1868 and chartered as a city in 1889. Population in 1920, 15,873.

Saint Croix, *Kroi,* **River,** a river of Wisconsin, rising near the west end of Lake Superior and flowing southwestward until it reaches the eastern boundary of Minnesota, thence southward. It enters the Mississippi about 20 m. below St. Paul. It forms a portion of the boundary between Wisconsin and Minnesota. Its entire length is about 200 m. An expansion, beginning at Stillwater, extends southward for 26 m. and forms St. Croix Lake, which has an average width of 2 m. The river is navigable to St. Croix Falls, about 55 m. above its junction with the Mississippi.

Sainte-Beuve, *Sahnt"-Buv',* **Charles Augustin** (1804-1869), a French critic, born at Boulogne-sur-Mer. He contributed valuable critical essays to the *Revue de Paris* and the *Constitutionnel;* the articles to the latter were published under the title of *Causeries du lundi,* or

Monday Chats. In 1854 he was appointed to the chair of Latin poetry at the College of France. His poetry, done in an individual manner, possesses the charm of simplicity and sincerity.

Saint Eli'as Mountains, a range extending along the coast in southeastern Alaska and northwestern Canada. It consists of a broad, elevated belt or plateau, upon which rise numerous peaks. The highest peaks are Mt. Logan, estimated from 18,000 to 19,500 ft., and Mount St. Elias, 18,026 ft. Some of the other important peaks to the southeast of these are Vancouver, Cook and Fairweather. These mountains contain a number of glaciers.

Saint El'mo's Fire, an atmospheric phenomenon due to electricity. It occurs in certain states of the atmosphere, as yet but little understood, as a silent discharge between elevated points of objects, such as the tops of poles or masts of ships. The flash appears as a brush-shaped jet of flame of a pale white light. See LIGHTNING.

Saint Gaudens, *Sant Gau' denz,* **Augustus** (1848-1907), one of the foremost American sculptors. He was born in Ireland of French and Irish parentage, but came with his parents to New York City at an early age. He studied at Cooper Institute and at the American Academy of Design and also in Paris. He was the first American sculptor equipped with French training, and his works are in emulation of the best French standards and methods of execution without being in any way an imitation. His style is polished and is marked by an originality, freshness and freedom that give this artist a unique place in American sculpture. In addition to numerous portraits in low relief, he executed a number of ideal figures and groups, among them *Hiawatha; The Peace of God,* in Rock Creek cemetery, Washington; the angels for the tomb of Governor Morgan; and *The Puritan,* at Springfield, Mass. But the greatest works of Saint Gaudens are: the *Shaw Memorial* at Boston, a large relief with an elaborate architectural setting, representing Colonel Shaw at the head of his colored troops; the Lincoln Statue in Lincoln Park, Chicago; the Farragut Statue and that of General Sherman in Central Park, New York City.

Saint George's Channel, an arm of the sea connecting the Atlantic Ocean and the Irish Sea and separating southern England and Wales from southern Ireland. It extends about 100 m. from northeast to southwest and varies in width from 60 to 100 m. There is a range of 300 to 500 ft. in depth.

Saint Gotthard, *Sant Goth' ard,* **Tunnel,** a railway tunnel through the Alps at St. Gotthard, Switzerland. It is 9.25 m. in length, and connects Airolo with Göschenen. It was begun in 1872 and completed in 1880 at a cost of about $13,000,000. It has double tracks, one for trains going each way, and the time required for the passage of trains is 20 minutes. The middle point of the tunnel is 6076 ft. below the crest of the mountain. It is approached at each entrance by a spiral railway, requiring the highest degree of surveying skill in its construction. The expense of construction was assumed jointly by the governments of Italy, Switzerland and Germany. At the time of its completion St. Gotthard was the largest tunnel in the world.

Saint Hele'na, an island in the South Atlantic, a possession of Great Britain. It is of interest by reason of the fact that it was the scene of Napoleon's captivity. The nearest land is the Island of Ascension, 700 m. distant; the African coast lies 1200 m. east. It has an area of about 47 sq. m. In direct line of ocean communication between Europe and the East, it has come to be a valuable port of call for vessels. It is an extinct volcano. Farm and garden produce are raised. Jamestown, the only town, has 3000 inhabitants.

Saint Hyacinthe, *Hi' a sinth,* a city of Canada, in the Province of Quebec, capital of the County of St. Hyacinthe, situated on the Yamaska River and on the Canadian Pacific, the Grand Trunk, the Intercolonial and the Quebec South-

ern railways. Among the public institutions are St. Hyacinthe College, a dairy school and the monasteries of the Dominican Fathers and the Precious Blood. It is also the seat of a Roman Catholic bishopric. Boots, shoes, woolens, organs, leather and agricultural implements are manufactured. Population in 1911, 9797.

Saint John, a city of Canada, the capital of St. John Co. and commercial center of New Brunswick, is situated on a rocky peninsula at the mouth of the St. John River and on the Canadian Pacific and the Intercolonial railways, 190 m. n.w. of Halifax. The waters of the harbor are six to eight feet higher than the river at high tide, and an equal distance below at low tide, thus giving the phenomenon of the "Reversible Falls." Partridge Island protects the harbor from the Bay of Fundy, noted for its tides, and is the site of a lighthouse and a quarantine hospital. Among the public buildings are the custom-house, soldiers' home, the Roman Catholic Cathedral, Baptist Seminary, Masonic and Odd Fellows' Halls, the Wiggins Orphanage and the provincial insane asylum. St. John has recently become a winter port for the shipment of lumber and the agricultural products of the prairie regions beyond Lake Superior, and has steamship connection with Great Britain, the West Indies, Nova Scotia and Maine ports. The chief industries include lumbering, shipping, fishing, shipbuilding and the manufacture of clothing, lumber products, machinery, nails, iron and brass work, brooms and brushes.

The Micmac Indian settlements on this site were visited by De Monts and Champlain on Jan. 24, 1604, and were named St. John in honor of the day. Charles de la Tour established a fort and trading post in 1630 and a settlement was begun in 1635. St. John was the scene of much contention between the French and English but was ceded to England by the Treaty of Utrecht in 1713. Its population was increased in 1783 by the coming of 10,000 Empire Loyalists from the United States. Population in 1911, 42,511.

Saint John River, a long river of New Brunswick, rising in Maine and flowing by a circuitous route, first northeast and then southeast, into the Bay of Fundy at the city of St. John. Near the mouth are rolling hills and bold bluffs and cliffs of such beauty that the river is sometimes called the "Rhine of America." The St. John River is 450 m. long and is navigable for large vessels to Fredericton, the capital of New Brunswick, a distance of 84 m. Smaller vessels ascend to Woodstock, 104 m. from the mouth. Near the Maine boundary are the magnificent Grand Falls, 74 ft. in height. Some of the important tributaries are the Aroostook, the Tobique, the Nashwaak and the Madawaska.

Saint John's, the capital of Newfoundland, situated in the extreme eastern part of the island 1700 m. from Queenstown, Ireland, and 550 m. n.e. of Halifax. The city rises from the sea shore and has a magnificent site on a landlocked harbor, which is strongly fortified. The principal public buildings include Roman Catholic and Anglican cathedrals, the House of Parliament, the Government House, the post office and museum and the buildings of St. John Athenæum and St. Bonaventure colleges. The chief industries are connected with the fisheries. There are manufactories for machinery, rope, boots and shoes, leather, soap and ship bread. Population in 1911, 31,501.

Saint Johns'bury, Vt., county seat of Caledonia Co., 34 m. n.e. of Montpelier, on the Passumpsic River and on the St. Johnsbury & Lake Champlain and Boston & Maine railroads. It is situated in an agricultural region and dairying is given considerable attention. The city has the works of the Fairbanks Scale Company, one of the largest establishments of its kind in the world. The other manufactures include farm implements, steam hammers and electrical machines. The educational institutions are the St. Johnsbury Academy, Notre

Dame Academy, the Athenæum Library and Art Gallery and the Fairbanks Museum of Natural History. St. Johnsbury was settled in 1786 and incorporated in 1884. Population in 1920, 7163.

Saint Johns River, the principal river of Florida, rising in Brevard and Osceola counties and flowing northward for about 400 m. It empties into the Atlantic Ocean 15 m. n.e. of Jacksonville. Steamboats ascend the river to Enterprise, 230 m. It flows through a chain of lakes, the largest of which is Lake George, and its course is bordered by semitropical vegetation. At its mouth a channel is kept open by means of jetties, and the river has been dredged to a depth of 18 ft. to Jacksonville.

Saint Jo'seph, Mo., a city, port of entry and county seat of Buchanan Co., 63 m. n.w. of Kansas City and 132 m. s. of Omaha, Neb., on the east bank of the Missouri River and on the Atchison, Topeka & Santa Fe, the Chicago Great Western, the Chicago, Burlington & Quincy, the Missouri Pacific, the Chicago, Rock Island & Pacific, the St. Joseph & Grand Island and other railroads. A steel bridge across the river connects the city with Elwood, Kan., and is used by two railroads. St. Joseph is known as the Central Western Gateway on account of its large number of railroads, which make the city a transportation center of great importance. The city maintains a fine system of street railways, and interurban lines connect with the near-by towns and villages. St. Joseph is the third city of Missouri and ranks high among the cities of the state in industrial, jobbing, packing-house and slaughtering interests. South St. Joseph has extensive stockyards.

Parks and Boulevards. St. Joseph has an area of over 9 sq. m. and about 3 m. of water front. The city contains over 82 m. of well-paved and shaded streets and is laid out on hills above the bluffs of the river. There are many handsome residences. Prospect Park of 70 acres, Krug Park of 30 acres and Bartlett Park of 20 acres are the largest of the city park system. There are also five small parks one block square. Lake Contrary is a near-by popular summer resort.

Public Buildings. The noteworthy buildings include a courthouse, rebuilt in 1885, Federal Building, city hall, auditorium, Patee Market House, the Elks, Lotus, Columbus, Country Club, Highland, Green Hills and Benton clubhouses, United States Weather Observatory, Masonic Temple, Scottish Rite Cathedral, Y. M. C. A. and Y. W. C. A. buildings, Commerce Club and Corby Forsee buildings, Union Station, Live Stock Exchange Building, the Robidoux, St. Francis, Metropole, Hyde Park, St. Charles and other hotels, banks, theaters; about 70 churches.

Institutions. The leading educational institutions include the Central High School built at a cost of over $113,000, public and parish schools, St. Joseph Business University, a junior college, two commercial colleges, a public library and Washington Park and Carnegie Branch libraries. Among other institutions are St. Joseph Hospital, Missouri State Hospital for the Insane No. 2, Home for Little Wanderers, Home of Sheltering Arms, Memorial Home, Ensworth Hospital and a number of sanitariums.

Industries. The industrial interests cover a wide range and relate principally to slaughtering and meat packing and to the marketing of hay, grain, farm products and live stock. The city contains the only tannery west of the Mississippi River, which is supplied with hides from local packing houses. There are large printing establishments and manufactories of sash, blinds and doors, pumps, wall paper, cigars, boilers, engines, flour and cereals, crackers and confectionery, harness, wool blankets, vehicles, farm implements and art goods. St. Joseph is also a large jobbing point for shoes, hardware, hats, caps, millinery and groceries.

History. In 1826 Joseph Robidoux, a French half-breed trader, established a trading post on the site of St. Joseph

and thus became the founder of the city to which he later gave his own name. A settlement grew up about this trading center, which was incorporated as a town in 1845 and as a city in 1851. The city was a prominent outfitting place for miners after the discovery of gold in California in 1848. The first pony express left from St. Louis for San Francisco in April, 1860. Population in 1920, U. S. census, 77,939.

Saint Law'rence River and Gulf, one of the largest North American rivers and forming the outlet of the Great Lakes. It leaves Lake Ontario by means of a broad extension known as the Lake of the Thousand Islands, and flows northeast, forming for a distance the boundary between the United States and Canada and finally flowing into the Gulf of St. Lawrence by means of a broad estuary fully 90 m. across. The Lake of the Thousand Islands is an extension of the river set with innumerable islands, whose beauty and picturesqueness attract tourists during the summer months. The region of islands extends from Gananoque to Brockville, and below the latter city the river again narrows and rushes in tumultuous rapids down a course known as the Long Sault. Beyond this it broadens into Lake St. Francis, passing through the Cedar and the Cascade rapids and Lake St. Louis to the treacherous Lachine Rapids just above Montreal. Through its lower course many tributaries join the river, and its banks gradually separate farther and farther. Large islands intercept its course, and at last it becomes a part of the Atlantic between Point des Monts and Cape Chat, 550 m. from Lake Ontario.

The St. Lawrence discharges more water into the ocean than any other river of the world, except the Amazon. It has been a highway for traffic since the 16th century, and by a treaty between Great Britain and the United States, its waters are forever open to international commerce. It carries the wealth of forest, mine, field and river, and its great canals about the rapids of Lachine, Soulanges, Cornwall and elsewhere render its course uninterrupted to commerce.

Historically the St. Lawrence is of great interest. Tales of exploration, warfare, discovery and settlement mark every cape and island, and legends cluster about every picturesque spot along its course.

Saint Louis, *Loo' is,* **Mo.,** a port of entry, largest city of the state and fourth city of the United States, is situated 284 m. s.w. of Chicago, 729 m. s. of St. Paul, Minn., and 709 m. n. of New Orleans, La., on the west bank of the Mississippi River, about 20 m. below the mouth of the Missouri River, and on the Missouri Pacific, the Chicago, Rock Island & Pacific, the Missouri, Kansas & Texas, the St. Louis & San Francisco, the Cleveland, Cincinnati, Chicago & St. Louis, the Chicago, Burlington & Quincy, the Wabash, the Chicago & Alton, the Baltimore & Ohio Southwestern and numerous other railroads. The city lies on a curve of the river having a generally eastern direction, and is crossed by four bridges; the Merchants' Bridge, built in 1887-90; the McKinley Bridge, the Eads Bridge, built in 1867-74, which cost, together with its vast tunnel, about $10,000,000, and the Municipal Free Bridge recently completed. This is the largest double deck steel span bridge in the world. The St. Louis Union Station, one of the largest and finest railway terminals in the world, is used by all the trunk lines entering the city. This station covers 11 acres and gives accommodation to 32 tracks. The city maintains an excellent street-car system which is controlled by one corporation.

The vast railway transportation and the Mississippi and its tributaries, comprising a waterway of over 13,000 m. in length, make St. Louis rank high among the great receiving and distributing centers of the country. The city has a fine position as a shipping point for not only the South and Southwestern country, but likewise for the East and West. It is also a port of entry.

SAINT LOUIS

Streets, Parks and Boulevards. The city covers an area of over 62 sq. m. and has an elevation of more than 425 ft. above sea level. The higher portions lie about 200 ft. above the river level. The river front, known as the levee, is over 5 m. long. Inside its present limits St. Louis has about 19 m. of river frontage. The wholesale mercantile district lies between Second Street and Eighteenth Street on Washington Avenue, while Fourth Street is the financial center. The city is not densely built and the residence districts extend far out in the suburbs. St. Louis is essentially a city of homes and there are hundreds of magnificent residences. Lindell, Washington, West Pine and Kingshighway are notable avenues, while Portland, Westmoreland, Vandeventer, Westminster and Kingsbury places are especially attractive. The city park system is one of the oldest of municipal improvements. In 1812 the first land was obtained and laid aside by the city for the recreation of the people. There are 55 parks containing a total area of over 2300 acres. Forest Park is the largest and contains 1300 acres, in one end of it was held the Louisiana Purchase Exposition in 1904. The new Jefferson Memorial Building, the Art Museum and the "Zoo" are in this park. The Missouri Botanical Gardens, which stand first in the rank of educational botanical gardens, and Tower Grove Park of 277 acres were gifts to the city by Henry Shaw, a public-spirited citizen who also endowed the Botanical School of Washington University. Among the other parks are Benton, Carondelet, Carr Square, Compton Hill, Dakota, Fountain, Gravois, Hyde, Sherman, Lyon, Kenrick Garden, Laclède, O'Fallon, Rose Hill, Washington Square, Fairground, Gamble Place, Yeatman Square, Lafayette and Page Avenue. Tower Grove Park contains bronze statues of Columbus, Shakespeare and Humboldt by Ferdinand von Mueller of Munich; Lafayette Park contains replicas of Washington by Houdon and of the Schiller Monument at Marbach, Germany; also a statue of Thomas Hart Benton by Harriet Hosmer. The City Hall Park contains a bronze statue of General Grant by R. F. Bringhurst. There are about 17 public playgrounds aside from the city parks, which are under the direction of the Public Recreation Committee. The average annual cost of maintenance of the public park is over $176,000. Jefferson Barracks, a national military post, is about 12 m. south of the city. Calvary and Bellefontaine cemeteries, the largest in the city, contain notable monuments to Henry Shaw, W. T. Sherman, Sterling Price and Stephen W. Kearny, who were closely associated with the interests of the city and the state.

Public Buildings. The representative business and municipal structures include the Municipal Courts Building; new Federal Building, built of Maine granite; the custom-house; city hall, built at a cost of $2,000,000; the county courthouse, a semiclassic massive stone structure; the Coliseum, with a seating capacity of 14,000; the Pierce, the Wright, the Merchants' Exchange, the Century, Laclède, La Salle, Federal Reserve, Arcade, the Architectural Club, the Y. M. C. A., the Central National Bank, the Union Trust, the Fullerton, the Metropolitan, Railway Exchange, the Commonwealth Trust, the Mississippi Valley Trust, the St. Louis, the University, the Columbian and the Mercantile Club buildings. The shopping district on Olive Street from Broadway, or Fifth Street, to Twelfth, and also on Washington Avenue, contains many notable examples of massive department-store architecture. The hotel needs of the city have been met by a large number of hostelries, the Buckingham, the Planters, the Statler, the Majestic, the Jefferson, the Washington, the American, the Hamilton, the Marquette and the Maryland. The strength of the St. Louis banks makes the city a financial reserve center. A Federal Reserve Bank is located here. There are about 12 theaters. The city has a large number

of costly churches. The new cathedral for the archiepiscopal see of St. Louis is one of the notable features of the city. The cost was about $3,000,000 and it is one of the most magnificent of the modern American cathedrals. Other handsome church edifices include the Pilgrim Congregational, the Church of the Messiah, the great pillared Temple of Israel, the $200,000 Second Baptist, and the Westminster Presbyterian. There are also other handsome churches on Kingshighway and Washington Boulevard.

The Cupples Station buildings represent an important commercial feature of St. Louis. These 20 buildings cover four acres of ground at the east end of the railroad yards and are occupied by about 30 wholesale firms. These buildings are centered at the most advantageous point for handling freight. In this systematic way over 50 cars with 1000 tons of assorted merchandise are received and shipped in a day.

INSTITUTIONS. St. Louis is the seat of Washington University, a generously endowed institution for higher and professional education (See WASHINGTON UNIVERSITY). The city also contains St. Louis University (Catholic), which dates from 1829; Forest Park University for Women; a normal school for training teachers for the elementary grades of the public schools; St. Louis College of Physicians and Surgeons; the Kenrick Theological Seminary; Forest Park Art Institute; Concordia Theological Seminary; Eden; and the Benton, Metropolitan and St. Louis universities. The Barnes Hospital, costing more than $3,000,000, provides this city with the largest teaching hospital service of any city in America. There is a fine system of public schools which is recognized as one of the best in the country. The high schools include the Central, Cleveland, McKinley, Yeatman, Soldan and Sumner high school for colored pupils. Among the public schools with handsome buildings are the Ashland, Scruggs, Hamilton, Webster, Humboldt, Cupples and William Clark schools. There is the Harris Teachers College for training teachers to teach in the elementary grades of the public schools. There is also a school for the deaf, eleven special schools for backward and defective children, three schools for truant boys, two open air schools for tubercular children, and an industrial school for delinquent children located on a large farm about five miles from the city. There are 131 schools representing an investment of nearly twenty million dollars. An Educational Museum containing over 100,000 specimens is a part of the public schools system. There are also numerous convents, parochial schools, business colleges and musical conservatories. The Central Public Library is a magnificent structure built at a cost of $1,500,000. There is also a city library, with 312,000 volumes, the Cabanne, Carondelet, Barr and Crunden branch libraries, the gift of Andrew Carnegie, and the Mercantile Library. The benevolent and charitable institutions include the Missouri School for the Blind, city dispensary, various city hospitals, insane hospitals, reformatory workhouse and numerous homes for the aged and for children.

INDUSTRIES. St. Louis is the fourth city in the United States in the value and output of its manufactures. The city has had a steady growth. Its manufactures aggregate about three-fifths the value of the total products of the state. St. Louis is the largest shoe market, making about one-fifth of the shoes made in the United States. It has the largest primary fur traffic, amounting to about $25,000,000 annually. St. Louis is the greatest tobacco-manufacturing city in the Union, and each year its annual handling of grain of all kinds aggregates in round numbers 150,000,000 bushels. Allied with the grain trade is that of the milling industry, and large quantities of flour are annually exported to foreign countries. The live-stock, meat-packing and kindred industries are also largely developed, and there are ex-

tensive manufactories of clothing, agricultural implements, woodenware, furniture, paints and oils, terra cotta, electrical supplies, corrugated bars, drugs and chemicals, trunks and bags, steel castings, tin and enameled ware, wool products, steam and electric street cars, stoves, photographic dry plates, carpets, sanitary engineering supplies, lumber and clay products, vehicles, plumbers' supplies, soap and candles. There are heavy shipments of farm products, coal and hides and there is an enormous freight tonnage. The city is also the largest primary fur market, drawing supplies from northern Canada and Alaska.

HISTORY. St. Louis was settled as a trading post in 1764 by Pierre Laclède Liguest, a representative of a company to which France had granted the greater part of the trade of the Missouri-River country. The settlement was at first called Laclède's Village, but soon after was named St. Louis in honor of Louis IX of France. In 1765 St. Louis was made the capital of Upper Louisiana. In 1770 the Spanish took possession, as by secret treaty France had in 1762 ceded the entire territory west of the Mississippi to Spain. The territory was ceded back to France by another secret treaty in October, 1800, and on Apr. 30, 1803, Napoleon sold the territory to the United States (See LOUISIANA PURCHASE). Under American rule was added the trade of a military-supply point, and in 1817 steamship traffic was begun with New Orleans and other Mississippi River ports. The Missouri Pacific Railroad, the first railroad built in Missouri, was opened in 1854. During the Civil War St. Louis was the base of supplies for the Union forces. At Carondelet, now South St. Louis, were built the first ironclad gunboats which played an important part in the capture of Confederate strongholds on the Mississippi River. St. Louis was incorporated as a town in 1808; in 1823 it was granted a city charter, and in 1914 a new reform charter was adopted. Population in 1920, U. S. census, 772,897.

Saint Louis University, at St. Louis, Mo. (1832). This is a Roman Catholic university, first opened in 1829 by the Jesuit Fathers. It has a fine location on Grand Avenue and is a large and flourishing institution. The buildings are valued at more than $1,000,000. It comprises the following departments: academy, college, commerce, military science, philosophy, science, medicine and divinity. Its library contains some 60,000 volumes, many of which, huge in size and quaint in binding, are valuable examples of the bookmaking of earlier days in other lands. The faculty numbers about 175, and the total enrollment is about 1400.

Saint Mark, Cathedral of, a famous cathedral of Venice facing the Square of St. Mark. It is built in the form of a cross 250 ft. long and 170 ft. wide at the arms; before it stand the four bronze horses that were presented to Nero and that centuries later were taken to Paris when Venice was sacked by Napoleon.

The cathedral is a combination of Byzantine and Venetian architecture, showing many peculiarities of style. The roof has innumerable small cupolas that remind one of Moorish minarets, while the rows of arches below are decidedly incongruous. The five porches in front are covered by a deep balcony stately in itself but losing its effect through combination with differing styles of architecture. Before these porches are three iron sockets, which formerly bore the proud banners of Venice. The interior of the cathedral is magnificent with mosaic and statuary. Above the central door is a representation of Christ, Mary and St. Mark, the last being the patron saint of Venice. The three domes have mosaics representing various Biblical scenes and characters, while bronze and marble statuary are everywhere. Chief among the latter are the statues of St. Mark, Mary and the Twelve Disciples. The relics of St. Mark lie beneath the high altar.

Saint Paul, Minn., the capital of the state and county seat of Ramsey Co., 410 m. n.w. of Chicago, on the Mis-

sissippi River, at the head of navigation, and on the Great Northern, the Northern Pacific, the Minneapolis, St. Paul & Saulte Ste. Marie, the Chicago & North Western, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago Great Western and the Minneapolis & St. Louis railroads, their mileage being 59,508, nearly one-fourth the total mileage of the country. It has four transcontinental roads and is the home office of two. Electric railroads connect St. Paul, Minneapolis and other cities. On its seven hills extending back from the river, St. Paul's situation is picturesque and imposing. The main business district is on a plateau at the base of the hills. The altitude is about 800 ft. The city is the port of entry for the Minnesota customs district, and Canadian imports form a considerable part of its commerce. St. Paul is the leading jobbing center and one of the leading retail centers of the Northwest.

Parks and Boulevards. St. Paul occupies an area of 55 sq. m., and there are 530 m. of improved and shaded streets. The residential districts are handsomely laid out with wide lawns and gardens. Summit Avenue Boulevard, 200 ft. wide, extends for nearly 3 m. between elegant residences. The many lakes within and near the city have been utilized in the park system. Como Park, 425 acres, includes Lake Como, and unusual floral gardens. Phalen Park, with a water area of 400 acres, and historic Indian Mounds, in a river bluff park, are popular outing places. There are also about 73 small parks, squares and plazas, aggregating 882 acres. Harriet Island, in the river opposite the business part of the city, is an attractive pleasure ground, with free public baths and zoological gardens. Adjoining the city is Ft. Snelling, one of the most important military posts in the country. The Round Tower, erected in 1820 for the protection of settlers in Indian wars, still stands there. The park systems of St. Paul and Minneapolis are connected by drives and parkways which extend along the Mississippi River bluffs. The Minnesota State Fair, the largest of its kind, is held annually on extensive grounds within the city, which St. Paul donated to the Minnesota State Agricultural Society.

Public Buildings. Chief among the noteworthy buildings is the state capitol, completed in 1905, at a cost of $4,500,000. Many architects and artists regard it as one of the most beautiful state capitols in the Union. It is built of Minnesota granite and Georgia white marble. The interior decorations are by Millet, Blashfield, Cox, Volk, Simmons, Zogbaum, Pyle, Garnsey and La Farge, and the sculptural decorations by French. Other prominent buildings include the courthouse, city hall, Federal Building, Municipal Auditorium, a $10,000,000 Union Depot; a splendid cathedral rivaling the State House in beauty; a magnificent athletic club costing $1,250,000; a public library, one of the finest in the country; Y. M. C. A. and Y. W. C. A. buildings; armory; Commerce Buildings, housing the Saint Paul Association; the Railroad Building; the Pioneer, Germania Life, New York Life, Endicott, Merchants National Bank and Lowry buildings; several large hotels and theaters; and many great wholesale houses and factories. There are 170 churches and 12 clubhouses. The library of the Minnesota State Historical Society now occupies a $500,000 building near the state house. The city has recently voted $3,000,000 for new school buildings.

Institutions. The leading educational institutions include Hamline University (Methodist), coeducational; Macalester College (Presbyterian), coeducational; St. Thomas College (Catholic); Agricultural College of the University of Minnesota; Lutheran Theological Seminary; St. Paul College of Law; and St. Paul Seminary. St. Paul has 54 public elementary schools, four high schools and 20 parochial schools. The St. Paul Institute, privately supported, maintains one of the best art schools in the West and cooperates with the public schools, providing educational and cultural opportunities for the employed and those

beyond school age. The Institute, in conjunction with the public schools, conducts night schools (attendance over 1000) giving courses taught in the day schools and the first two years of the academic college of the state university; it also maintains trade courses. The Institute's art gallery and scientific museum are in the Auditorium. James J. Hill has a notable art gallery in his residence, containing the finest paintings of the Barbizon School in America.

Commerce and Industry. St. Paul is on what might be called the "manufacturing frontier," for this is the nearest manufacturing center to the vast empire which extends from the Great Lakes to the Pacific, and manufacturers have advantages of distance, time and freight rates, availability of raw materials, high-class and dependable labor supply, favorable housing conditions for workers, unusual trackage facilities on account of the convergence of railroad lines, and the presence of cheap power. From 1900 to 1910 the number of manufacturing establishments increased from 537 to 719, and the value of the products from $30,056,000 to $58,900,000.

St. Paul is one of the principal markets in the United States for furs; and coal, wood, grain and farm produce constitute heavy exports. The manufactured products include boots and shoes, foundry and machine-shop products, fur goods, men's clothing, tobacco, cigars, harness, agricultural implements, furniture, refrigerators, grass rugs, hats, linseed oil, coke, crackers, confectionery and lumber products. The city also has large railroad repair shops and printing and publishing establishments. There are extensive stockyards and slaughtering and meat-packing plants in South St. Paul, a neighboring suburb.

History. The Jesuit Hennepin visited the site of St. Paul in 1680. The Indian name for the place at this time was "Innijiska," or White Rock, the term denoting the white bluffs of the river. Between 1690 and 1700 a trading post was established by Le Sueur and Perrot, French traders, and in 1805 Lieut. Zebulon M. Pike concluded a treaty with the Sioux Indians. By the Treaty of Prairie du Chien, in 1837, the site of St. Paul was opened to settlement. In 1841 Father Lucien Gaultier erected a log chapel, which he named St. Paul's. In 1849, on the erection of Minnesota Territory, St. Paul, which derived its name from the chapel, was incorporated and became the capital. After the admission of Minnesota as a state in 1858, St. Paul continued as the capital. In 1874 West St. Paul was annexed, and in 1884 the city limits were extended to the Minneapolis line. The great increase in settlement of the Northwest greatly added to the commercial and industrial importance of the city. The commission government was adopted in 1912 and became effective in 1914. Population in 1920, 234,595.

Saint Pe'tersburg, or **Petrograd,** capital of Russia, situated at the eastern end of the Gulf of Finland, at the mouth of the Neva River, 400 m. n.w. of Moscow. In point of size it is the fifth city in Europe, coming after London, Paris, Berlin and Vienna. The main part of the city extends along the left bank of the river, on low land which is frequently subject to overflow. The islands lying in the delta of the river are connected with the mainland by bridges, some of them permanent, others built on boats and removed during the winter. From November to April thick ice roadways, artificially lighted, afford passage across the Neva. Among the prominent bridges are the Nicholas, the Palace, the Alexander and the Troitsky.

Streets, Squares and Public Buildings. Of the four quarters, the Admiralty Quarter in the center of the city is the most important. The admiralty offices and a museum are contained in a building 1600 ft. long, and from it radiate the three principal streets, of which the fashionable Prospekt Nevskiy is one of the finest in Europe. The squares include the Palace Square, containing the Alexander Column; the Senate Square, with the equestrian statue of Peter the

Great; and the "Field of Mars," a large parade ground formerly a marsh, with a statue of Suvaroff. The buildings of importance are the famous Winter Palace, a vast structure and among the celebrated royal palaces in the world, the Taurida Palace, the Anitchkoff, the Mikhailovsky, the Marble Palace, the Cathedral of St. Isaac, the Cathedral of Our Lady of Kazan, the Alexander Nevskiy Monastery, the Cathedral of SS. Peter and Paul, the exchange, the Asiatic Museum, the Academy of Sciences, the Hermitage containing valuable collections of paintings and sculptures, the Academy of Art and the Alexander III Museum.

As the intellectual center of Russia, St. Petersburg exercises a pronounced influence. In addition to the university, with an attendance of about 4000 students, are the Military Academy of Medicine, the Technological Institute, the Nicholas Military Academy, the Military Academy of Law, the Imperial Historico-Philological Institute, the Alexander Lyseum, the institutes of mining, civil engineering, forestry and archæology and the Greek Orthodox and Roman Catholic academies. It is the center of Russian music and opera, and superior musical instruction is given in the conservatory of music. The Imperial Public Library, containing over 1,500,000 volumes and manuscripts, is surpassed in size and importance only by the British Museum and the Bibliothèque Nationale.

Commerce and Industries. The commercial and industrial development of the city has been very extensive during recent years, and it now ranks second to Moscow in importance. The export and import trade is large, despite the fact that the harbor is ice-locked through several months of the year. The principal exports are lumber, agricultural and dairy products; the imports, foodstuffs, metals, coal and manufactures. The industries include printing works, potteries, carriage works, sugar refineries, distilleries, metal and machinery works, shipbuilding yards and the manufacture of tobacco, soap, paper, leather, candles and stone products. A ship canal to Kronstadt, the port of St. Petersburg, affords access to the largest vessels. The street railway lines, telephone lines, waterworks, docks, harbors and ferries are owned by the municipality and the National Government.

Government and History. The municipality, or municipal council, is elected by a small percentage of property owners, and the members serve for four years. The authority of the governor-general of the city is unlimited. The settlement of Landskrona, at the mouth of the Neva, was founded by the Swedes in 1300. Peter the Great captured their fortress in 1703, and on its site laid the foundation for the capital of the empire. He ordered thousands of the peasantry to give up their country homes in order to increase the population of the newly-founded city. The development was rapid, and soon a large number of foreigners, attracted by the growing export trade, flocked to St. Petersburg, giving it the cosmopolitan appearance it now presents. The rulers after Peter the Great who did most to further its progress were Anna Ivanovna, Elizabeth and Catherine II. It is the interpreter of West-European thinking. In 1914 the name was changed to Petrograd by Czar Nicholas II. Population in 1910, 1,907,708.

Saint Peter's Church, the largest Christian church in the world, located in Rome. The building is in the form of an Italian cross and is surmounted by a dome 195 ft. in diameter and 435 ft. high. The length of the building within the walls is 613 ft. and its width 87 ft. The dome can be easily ascended, and from it a good idea of the enormous size of the structure can be obtained. The piazza is surrounded by an extensive colonnade, which forms an approach to the cathedral, and is supported by 268 columns 48 ft. high and arranged in four rows. The piazza, which is oval in form, is ornamented by an Egyptian obelisk of red granite, 80 ft. high, which was brought from Egypt during the reign of Caligula. The piazza is also

adorned by two fountains, the most magnificent in Rome. Within, the canopy over the altar is 95 ft. high. Near the altar is a statue of St. Peter. The floor has an area of five acres and the cost of the church is estimated at $50,000,000.

St. Peter's is the outgrowth of a magnificent basilica erected by Constantine the Great in 306 over the spot where St. Peter is said to have been buried. During the 14th century the basilica was nearly in ruins, and Pope Nicholas V determined upon rebuilding it, but the work proceeded very slowly, and in 1503 Julius II decided upon an entirely new structure. The foundation was laid in 1506 and the work was committed to the celebrated architect Bramante. After Bramante's death the work was directed by several architects until 1546, when it was placed in charge of Michelangelo, who completed the dome and much of the building before his death. The church was dedicated by Urban VIII in 1626.

Saint-Pierre, *San"-Pyar',* **Jacques Henri Bernardin de** (1737-1814), a French author, born in Havre. He became the superintendent of the Botanical Garden of Paris in 1792 and was elected a member of the Institute in 1795. His works include *Voyage to the Isle of France, Studies from Nature* and *Paul and Virginia.* The last is an idyll of innocent childhood, cloyed with unhealthy sentimentality and gaudy style, but of great influence because of his faithful description of nature, imagination and freedom.

Saint-Saëns, *San"-Sahns',* **Charles Camille** (1835-), a distinguished French composer, born at Paris. He entered the Paris Conservatory when very young and won several prizes for composition. Subsequently he held important positions as church organist in Paris, and later acquired fame as a concert pianist. He was successful in every form of composition and produced several operas and oratorios and a large number of "symphonic poems" for orchestra. His works include *Youth of Hercules, Phaéton* and *Samson and Delilah.*

Saint-Si'mon, Claude Henri, COUNT DE (1760-1825), a French socialist, born in Paris. When 16 he entered the army and, serving in the latter campaign of the American Revolution, distinguished himself at the surrender of Yorktown. During the French Revolution he voted for the abolition of titles, but took no active part in any of the political events. During the Revolution, and while imprisoned in the Luxembourg, Saint-Simon first conceived of a new social system which should be based on scientific rather than on political ideas. For several years he wrote widely on scientific and political themes, advancing such ideas as that an annual subscription should be taken up for men of genius and that religion was a human invention. Meanwhile, he had become more and more financially embarrassed, and it was only after his family settled on him a small pension that he was enabled to continue his work. He then began to attract a large number of disciples, notably Augustin Thierry, and these followers aided him in some of his subsequent writings. In 1825 he published his last and most remarkable work, *New Christianity.*

Saint-Simonianism, which embraced the beliefs of the sect named after the philosopher, advocated the abolition of the law of inheritance and the apportioning of property in direct ratio to individual capacity and labor.

Saint Sophia, *So fi' a,* **Mosque of,** one of the most beautiful buildings of the world, situated at Constantinople and for years used as a Moslem temple. The present edifice was built by Justinian during the interval 532 to 538, as a place of worship for the Greek Church, but has been many times remodeled and repaired. Its exterior is disappointing; it is a somewhat solid, dome-surmounted structure having four minarets, one at each angle of the building. The inner vestibule is a vast hall 205 ft. long and is lined with marble slabs and beautiful mosaics. Beyond this, the main hall, 235 ft. by 250 ft., is divided by magnificent pillars into aisles and galleries. The

central portion, supported by four huge piers and lighted by 40 windows, is surmounted by a great dome whose form is of remarkable beauty. The main dome rests upon two half domes, which, in turn, rest upon three half domes, so that from beneath, the impression is that given by billowing clouds in the heavens. Many of the columns are said to have been taken from various ancient temples. When the church was remodeled for purposes of Mohammedan worship, many of the rich mosaics were covered by plaster, but as the most of them were first protected by matting, they are not wholly lost.

Saint Thomas, *Tom' as,* a city of Canada, in the Province of Ontario, the capital of Elgin Co., on the Grand Trunk, the Canadian Pacific, the Michigan Central and other railways, 75 m. s.w. of Hamilton and 9 m. n. of Port Stanley on Lake Erie. It is one of the chief railway centers in southern Ontario, and is the distributing center for a large and fertile agricultural region; the export and the local trade are extensive. The Michigan Central Railroad has extensive machine- and car-building shops here. Other leading manufactures include agricultural implements, wagons and carriages, machinery and foundry products, mattresses, brooms, churns, flour and interior wood finishings. The city has a fine system of waterworks, electric lights and an electric-railway system. The leading public buildings include the city hall, market and county buildings. There are also numerous fine business blocks, banks and hotels. The city has numerous churches and many fine residences. Population in 1911, 14,054.

Saint Vitus's, *Vi' tus iz,* **Dance,** a disease of the nervous system, most commonly appearing in children between 5 and 15 years of age. It is more frequent in boys than in girls. It is characterized by involuntary jerky movements of the arms, hands, legs and feet and the muscles of the face, neck and chest. The seat of the disease is in the brain and spinal cord. It is aggravated by fatigue, fright, worry or rheumatism. The mind is seldom affected, but the patient is usually excitable. The best treatment is rest, nourishing food and quiet. Iron, arsenic and a few other drugs may sometimes prove beneficial. The disease is seldom fatal.

Sakhalin, *Sa" ka lyeen',* or **Saghalien,** *Sah" gah lyen',* a long narrow island off the northeast coast of Asia, separating the Japan Sea from the Sea of Okhotsk. The Gulf of Tartary lies between it and the mainland. Sakhalin has a rugged mountainous surface, generally forest-covered, and a severe climate. The inhabitants, who are chiefly exiles, live by trapping and fishing. A little grain is raised in the pasture lands and coal is mined. The entire island belonged to Russia until 1905, when by the Treaty of Portsmouth the southern portion was ceded to Japan. Population, 49,623.

Sal'adin (1137-1193), a noted Sultan of Egypt and Syria. He entered the service of Nureddin, Prince of Syria, and became sultan in 1174. After his title was confirmed by the Caliph at Bagdad he annexed Mesopotamia and other parts of Asia. In 1187 he defeated the Christians at Tiberius, took Jerusalem and captured Acre while the Christians were preparing the Third Crusade under Richard of England and Philip Augustus of France. They took Acre after a siege of two years. After Philip left, Richard made a truce of three years with Saladin (1192), by which the coast from Jaffa to Tyre was given up to the Christians, while the Moslems had the rest of the country. The next year Saladin died at Damascus. He was a wise and progressive ruler. He built roads and canals and strove to unify the people. He stands forth as the most polished and generous of Moslems. In *The Talisman* Scott describes the chivalry and courtesy of Saladin.

Sal'aman"der, a class of harmless Batrachians of the Salamander Family, living in moist woods and along streams throughout temperate and torrid zones. Like the newts, the salamanders pass

their various stages of development in different surroundings. The eggs and the tadpoles are found in the water; after the first season, the tadpoles lose their gills, develop lungs and become land animals, feeding upon insects, slugs, snails and worms. Later they return to the water to breed. Salamanders have smooth, spotted skins, long tails and lizardlike legs and feet.

Sal'amis, Battle of, one of the decisive battles of history, was fought by the fleet of allied Greeks and the Persians between the Island of Salamis and the coast of Attica in 480 B. C. The success of the battle was largely due to the generalship of Themistocles. After Thermopylæ (See THERMOPYLÆ, BATTLE OF) the Spartan soldiers had retreated to the Peloponnesus and the Athenians took to their ships. In the narrow strait between the shore and the Island of Salamis the Greeks had the advantage. The battle lasted from dawn to darkness, and though the Persian fleet was more than twice as large as that of the Greeks, and though it was manned by Asiatic Greeks and the famous Phœnician and Egyptian sailors, an overwhelming victory was gained by the Greeks. By this victory of Salamis the naval supremacy of Greece was assured.

Sal Ammo'niac, a crystalline substance having a sharp, biting taste and a tendency to vaporize easily. Chemically, it is known as ammonium chloride, being a compound of ammonia and chlorine. Sal ammoniac is manufactured from the solutions of ammonia salts produced at gas works and treated with hydrochloric acid, or by the heating of decaying organic animal matter with salt. It is of use chiefly as a medicine or in the production of ammonia.

Sal'ary Grab, the popular name given a law passed by Congress in 1873 by which the salaries of many officers of the government were raised. The law provided that the president should receive $50,000 per year instead of $25,000, as had formerly been the case; that the vice-president should receive $10,000 and that the members of the cabinet, Supreme Court justices and members of the Senate and House of Representatives should all benefit by this increase. The proposed changes probably would have met with little objection had senators and representatives who were responsible for the passage of the law not only voted their own increase from $5000 to $7500 per year, but also provided that this change should date back to the beginning of the Congress, a period of two years. By this means they each presented themselves with $5000 beyond the compensation to which they were entitled. It was this provision which gave the bill the name of the "Salary Grab Act." Public indignation forced the repeal of all provisions of the law except those which applied to the president and the justices of the Supreme Court.

Sa'lem, Mass., a city, port of entry and the county seat of Essex Co., situated on a peninsula formed by two inlets of the sea, called Danvers and Forest rivers, 17 m. n.e. of Boston, on the main line of the Boston & Maine Railroad. The Marblehead, Salem & Lowell, the Salem & Lawrence and the Wakefield-Reading branches of this road terminate here. Salem is the largest trolley center between Boston and Portland, Me., and the interurban electric railroads connect north to Danvers, Middleton, North Andover, Haverhill and Lawrence; eastward, to Beverly, Magnolia, Manchester, Gloucester, Rockport, Ipswich and Newburyport; southward, to Swampscott, Marblehead, Lynn and Boston; westward, to Peabody, Lynnfield, Wakefield and Reading. There is a good harbor and a coasting trade of considerable importance. Salem has some of the finest examples of colonial architecture in the world. Many fine houses were built here during the colonial period and the times of Salem's supremacy in the trade with the West and East Indies.

PARKS AND BOULEVARDS. Salem has an area of over eight square miles and has many historical and literary landmarks. There are six large attractive parks: the Willows and Forest River

bordering on the seashore, and Highland, Liberty Hill, Gallows Hill and Mack, inland, with a total of 375 acres.

Public Buildings. The public buildings include the Essex Institute, which contains valuable paintings and relics of the colonial period, and a library of several thousand volumes, some of which were published in the latter part of the 17th century. The Peabody Academy of Sciences and Museum, founded by George Peabody with a gift of $140,000, contains marine curios and a Japanese collection second to none in the country. Among the other buildings are the Bertram Public Library, Hamilton Hall, House of Seven Gables, the Witch House, the Armory of the Second Corps of Cadets and three courthouses. The Salem Marine Society was organized in 1799, its members being limited "to persons who have actually navigated the seas beyond the Cape of Good Hope or Cape Horn as masters or supercargoes of vessels belonging to Salem." This society assists the widows and children of the members.

Institutions. The educational institutions include a state normal school, public and parish schools and a high school. Other institutions include an orphan asylum under the direction of the Sisters of the Grey Nuns, a home for aged and destitute women, Bertram Home for aged men, the Plummer Farm School for boys, a home for girls and several hospitals.

Industries. Salem is primarily an industrial city. There is an important coasting trade in coal, lumber and lime, large quantities of which are transported to inland towns. The manufacturing establishments include tanneries, boot and shoe factories, cotton mills, chemical works, foundries, machine shops, fish-packing houses and manufactories of lumber products, silverware, electrical apparatus, steam specialties, lasts, toys and games.

History. Salem is rich in tradition. Among the features of historical interest are the Roger Williams House, where Roger Williams lived in 1635-36, and the First Church, which dates from 1629 and was the first Congregational church organized in America. In 1634-35 Roger Williams was pastor of the church, but was ordered banished the latter year for maintaining liberty of conscience (See Williams, Roger). The witchcraft delusion (See Witchcraft) broke out in 1692, and 19 persons were executed as witches, on what is now known as Gallows Hill Park. Salem was the birthplace of Nathaniel Hawthorne, who worked as surveyor of the port in 1846-49 in the custom-house, which is described in his introduction to the *Scarlet Letter*.

In 1774 the first provincial congress was held here and declared for the independence of the Massachusetts Colony. Salem furnished many armed privateers during the Revolution and War of 1812 and also a large quota of troops during the Civil War. Salem, after Plymouth, is the oldest town in Massachusetts. It was founded by Roger Conant in 1626 and it was first called by the Indian name of Naumkeag. A heroic-size bronze statue of Roger Conant has been erected on Washington Square south near Salem Common, by his descendants. In 1628 a patent for the territory was granted by the New England Council and John Endicott was made governor. He continued in this capacity under the charter of Massachusetts Colony until the arrival in 1630 of John Winthrop, who removed the seat of government from Salem to Charlestown, and thence to Boston. Salem was chartered as a city in 1836. Population in 1920, U. S. census, 42,515.

Salem, Ohio, a city of Columbiana Co., 70 m. s.e. of Cleveland and 20 m. s.w. of Youngstown, on the Pennsylvania and the Pittsburgh, Lisbon & Western railroads. It is the largest town in the county and the center of a coal-mining region. It also has extensive agricultural and stock-raising interests. Salem has machine shops, flour mills, sheet-metal, steel and iron works and manufactories of engines, tools, wire nails, pumps, church furniture, church

organs, brick and tile, rivets, motor boats and feed cutters. It was a station of the underground railway before the Civil War. Salem was settled in 1807, incorporated in 1830 and chartered as a city in 1887. Population in 1920, 10,305.

Salem, Ore., the capital of the state and the second city in population, also the county seat of Marion Co., situated on the Willamette River, 52 m. s.w. of Portland and on the Southern Pacific Railroad. It also has connection with Portland by steamer and by an electric line. Salem is a beautiful city, with broad, well-shaded streets and two public parks. The chief public buildings include the capitol, the state library, the city library, the Federal Building, the penitentiary, the city hall and the courthouse. Salem is the seat of the state reform school, school for the blind, school for the deaf, asylum for the insane and a government school for Indian children. The educational institutions include Willamette University (Methodist Episcopal), Academy of the Sacred Heart (Roman Catholic) and an excellent system of public schools. The city is in the midst of a rich agricultural district, for the products of which it is a central market. The manufactures include flour, lumber, foundry and machine-shop products and woolens. Population in 1920, U. S. census, 17,679.

Sal'ic Law, the code of laws of the Salian Franks. One of the laws in this code excluded women from inheriting certain lands, probably because military duties were exacted with the holding of those lands. In the 14th century, during the struggle between Philip VI and Edward III for the French crown, women were excluded from the throne of France by an application of this law. This is the first instance of the use of the term *Salic Law* in connection with women's inheriting the throne, but the term is now commonly employed in that sense.

Salicylic, *Sal" i sil' ik,* **Acid,** an organic acid found in the flowers of the meadowsweet and in the leaves, stem and berries of the wintergreen. The acid itself is a white, crystalline powder which does not dissolve readily in water but is easily soluble in alcohol and ether. It is the important constituent of oil of wintergreen, and in that compound as well as in many of its salts, is used as a medicine. Salicylic salts are also used to prevent fermentation.

Sali'na, Kan., a city and the county seat of Saline Co., 100 m. w. of Topeka, on the Smoky Hill River and on the Missouri Pacific, the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Union Pacific and other railroads. Salina is the market for the surrounding agricultural and stock-raising region, and in the neighborhood are gypsum quarries and valuable salt springs. Among the important industrial establishments are grain elevators, flour and paper mills, foundries, wholesale groceries and manufactories of carriages and agricultural implements. The chief institutions of the city are the Kansas Wesleyan University (Methodist Episcopal), opened in 1886, St. John's Military School (Protestant Episcopal), a business college, a government building, Oak Dale Park and a public library. The city is the seat of a Protestant Episcopal bishopric. Salina was founded in 1857 by Col. William A. Phillips, incorporated in 1870 and chartered in 1880. Population in 1920, 15,085.

Salisbury, *Saulz' ber y,* **N. C.,** a city and the county seat of Rowan Co., about 120 m. s.w. of Raleigh, on the Southern and other railroads. The town is a trade center of an agricultural and mining region. Cotton, tobacco and fruit are important crops. In and near the city are iron foundries, machine shops, railroad repair shops, tobacco factories, cotton and woolen mills, veneer works and manufactories of wagons, carfiages and felt mattresses. Granite is quarried near by. Salisbury contains Livingstone College (African Methodist Episcopal), removed from Concord in 1882. During the Civil War a military prison was located here and a military engagement occurred here in 1865. In the vicinity is a National cemetery. Salisbury was

settled about 1753 and two years later was incorporated as a town; it was chartered as a city in 1770. Population of city in 1920, 13,884.

Salisbury, Robert Arthur Talbot Gascoyne-Cecil, THIRD MARQUIS OF (1830-1903), an English statesman. In 1853 he entered Parliament for Stamford after receiving his education at Eton and Oxford. He began to contribute regularly to the *Saturday Review* and the *Quarterly,* his articles dealing chiefly with foreign affairs and upholding the conservative policy. In 1866 he became secretary of state for India in Lord Derby's government, but resigned in 1867. Two years later he became Marquis of Salisbury, and in 1874 was again secretary for India. He became secretary of state for foreign affairs in 1878, and went as plenipotentiary with Lord Beaconsfield to the Congress of Berlin. When his chief died three years later, he became leader of the Conservative Party, serving as premier three times. In July, 1902, he gave up his office and was succeeded by his nephew, Arthur Balfour.

The most important events of his long rule were the misunderstanding with the United States in regard to Venezuela in 1895, and the adjustment of German and English spheres of influence in Africa in 1890. He was a cautious minister, with the tastes and sentiments of an aristocrat. See BERLIN, CONGRESS OF.

Sali'va, a transparent, watery liquid secreted in the mouth by the salivary glands. It keeps the mouth moist, and during mastication mixes with the food, making it soft and smooth and easily swallowed. The saliva is also an important aid to digestion. The salivary glands are arranged in pairs. They are the parotid, on each side of the face between the ear and lower jaw; the submaxillary, under the lower jaw; and the sublingual, under the tongue. They are composed of numerous lobules, and are connected with the inner surface of the mouth by ducts which carry the saliva. Besides the three principal pairs of glands, there are numerous smaller ones with ducts, which carry their secretion to the soft palate, root of the tongue, lips and cheeks.

Sal'lust (86-34 B. C.), in full, Caius Sallustius Crispus, a Roman historian. Though of plebeian family, he became quæstor about 59 B. C. and tribune some seven years later. In the civil war he sided with Cæsar, and in 47 B. C., when Cæsar's fortune was growing, he was made prætor elect. The next year he engaged with Cæsar in his African campaign, following which he was left as governor of Numidia. With his immense fortune in later years he laid out what is still known as the Gardens of Sallust, and withdrawing into luxurious seclusion, devoted himself to historical writing. These writings include *Bellum Catilinarium,* descriptive of Catiline's conspiracy, and the *Jugurtha,* or *Bellum Jugurthinum,* a history of the five years' war against Jugurtha, King of Numidia. Sallust is the first Roman to have written what is now understood as history. His work is powerful and animated, though historically it is inexact and in style it is artificial.

Salmon, *Sam' un,* a large family of important food fish, including the whitefish, lake herring, true salmon and trout. All are of graceful form and bright color and of such activity as to place them among the best of game fishes. The true salmon have long, oval bodies, with loose, rounding scales, which do not appear upon the head, moderately long dorsal and ventral fins and a forked caudal fin, preceded by a fleshy, dorsal appendage known as the adipose fin. There is always a well-marked lateral line. Their internal structure is distinguished by the presence of many vertebræ, usually 60, and a large air bladder. The majority are marine fish but the various species are widely diverse in habits; those which live in the sea ascend rivers and coastal streams to spawn, while the fresh-water salmon reverse the process and, at the spawning season, make their way to the sea.

The Atlantic salmon, which is found from Cape Cod north, is the most widely sold in fresh form and constitutes one

of the important food fishes of the Eastern States. When adult it is blue-black in color but adopts different shades during different stages of its development; in the spawning season the male is especially brilliant in hue and is often termed redfish or bluefish; the female is known locally as the blackfish. During the spawning season the fish seek the tributary streams of the Atlantic coast, where the water is cool and where gravelly bottoms may be found for the reception of the eggs; here too, the young fry, when hatched, will be safer from the larger fish which prey upon them. Often to reach these quieter pools the parent salmon must make their way against strong currents, up falls of 20 or 30 ft., past obstructions and barriers which often prove insurmountable and cause the death of the persistent fish. At the spawning grounds both male and female aid in the preparation of troughs of sand for the reception of the eggs; these they make by plowing in the sand against the current. In the trough the eggs are carefully covered and left to hatch while the parents float downstream, tail first, dying before they reach the sea. The young fry of the first year are called *pinks,* and are distinguishable by characteristic color and undeveloped organs; in the second year they are called *smolts,* and in the autumn following, *pearls;* after spawning they are known as *kippers* or *kelts.* The time of taking the salmon is before the run or as they enter the rivers, since then their flesh is the firmest and of best quality. The flesh is sold smoked or fresh. The Eastern varieties were the chief dependence of the New England colonies and are still an important catch. They are also found in the waters of Kamchatka and Japan.

The Pacific salmon is an allied genus, consisting of at least five species. Of these the largest and most important commercially is the king or quinnat, salmon. It is a large fish whose ordinary weight is about 22 lb., but individuals weighing over 100 lb. have been taken. The scales are large and silvery, often marked with black spots. At the best season the flesh is the familiar, rich salmon-red. Like its Atlantic cousin the king salmon makes its home in the sea, going up the rivers only at spawning time; at this season the Alaskan rivers, the region of Kadiak Island, Puget Sound and the Columbia, Fraser and Sacramento Rivers are filled with the moving mass of blue-backed fish all pushing persistently up the streams. They are then easily taken with hook or net and are in the best condition for canning. At other seasons the flesh is apt to be lighter in color, and though no less pleasingly flavored is not as salable.

The silver salmon, a smaller fish whose average weight is about 10 lb., is another Pacific species, but because of the paler color the flesh is not so greatly valued. The pink, or humpbacked, and the dog salmon are still smaller and have flesh of inferior quality.

The canning industry began in the Pacific States on the Columbia River in 1866 and the quinnat was the first species canned. The process was then essentially the same as now. The fish is cleaned and the flesh packed, boiled and sealed in cans; 49 of these cans of one pound each constitute a case. Within 12 years of the time of the beginning of the industry canning was being done in Washington, California and Alaska. At present it is estimated that the salmon fisheries of the United States yield a total annual production of 90,000,000 lb. valued at $3,300,000. Of this, fully 15,000,000 lb. are sent out from the Western fisheries and at least from 7,000,000 to 9,000,000 lb. come from Alaska.

Owing to the large amount of salmon caught and the great demand for it, both fresh and canned, the supply would rapidly diminish were it not for the assistance of the United States Fish Commission and the artificial propagation of salmon fry. There are also five private salmon hatcheries in the United States.

Landlocked salmon are fresh-water fish of northern European countries which are now believed to be of the same genera as the Pacific and Atlantic salmon, but because by some means they have

been prevented from reaching the sea, they have developed different habits and traits. Fresh-water salmon of the United States are found chiefly in the Great Lakes and are there called the Mackinaw salmon. They are not so valuable as the whitefish but are an admirable food fish. See WHITEFISH; TROUT; HERRING.

Saloniki, *Sah" lo ne' ke,* or **Salonica,** an important seaport of Greece situated upon the Gulf of Saloniki, 315 m. s.w. of Constantinople. Anciently it was known as Thessalonica, and was the city to which the Apostle Paul addressed two of his Epistles. Saloniki has a fine harbor and ranks next to Constantinople as a commercial port of the Balkans. It is connected by rail with all the important cities of the Balkan states and sends out grains, flour, bran, silk cocoons, chrome, manganese, iron, hides, cattle, wool, eggs, opium and tobacco. The streets are broad, lava-paved avenues with some fine structures of modern type; among these are the churches, mosques, synagogues, public baths, schools and hospitals. Saloniki is highly interesting for its historical associations and contains many antiquities of importance, since the town has existed from 315 B. C. The population consists chiefly of Jews who fled hither from Spain during the Iberian persecutions. Saloniki was an important stronghold of the Turks during the Balkan War of 1912, and in its harbor a Turkish battleship was destroyed by Grecian torpedoes. Population, 174,000.

Sal'sify, Oyster Plant or **Vegetable Oyster,** a well-known garden plant cultivated for its long fleshy root, which has an oysterlike flavor. The plant is native in Europe, where it is widely cultivated as a food, and has been introduced into the gardens of the United States. The stem, which bears long undivided leaves and single blue flowers, attains a height of two or three feet. The roots, like that of the parsnip, are sweeter for being left in the ground over winter.

Salt, in the generic sense, a chemical compound formed by the substitution of a metal for the hydrogen of an acid. This is accomplished by an interchange of the atoms, and the hydrogen may be entirely displaced or only partially so. If all of the hydrogen is displaced, the resulting compound is called a normal salt; otherwise it is an acid salt. Sodium forms two such salts with sulphuric acid; the salt composed of sodium, sulphur and oxygen is called normal sodium sulphate; that which contains in addition one-half of the hydrogen is acid sodium sulphate.

Potassium and sulphur form three salts; potassium *sulphide,* which contains only potassium and sulphur, and no oxygen; potassium *sulphite,* which has three parts of oxygen; and potassium *sulphate,* which has four.

Salts differ from acids and bases in properties by being *neutral;* that is, they have no effect upon the vegetable dye, *litmus.* Sodium chloride, or table salt, is a common example of a salt. It is the product of the union of sodium and hydrochloric acid. See BASE; ACID.

Salt, Common, a substance in general use for preserving meats and other animal tissues and for seasoning food. Common salt is a compound of chlorine and sodium in proportion of 60.41 parts of the former to 39.59 parts of the latter, and chemically it is known as chloride of sodium. Its geological name is halite. The chief sources of salt are sea water, salt lakes, salt springs and rock salt. The salt of salt lakes is produced by first being dissolved from the land and carried to the lake by streams, then being deposited as the water of the lake evaporates. In lakes where evaporation exceeds the quantity of water flowing in, the waters become saturated and salt is deposited, as rock salt. Good illustrations of this occurrence are found in Great Salt Lake, Utah, and the Dead Sea, Palestine.

In nearly all countries there are deposits of rock salt, some of which are several hundred feet beneath the surface, and in many places these deposits are mined. The most celebrated salt mines in the world are at Wieliczka, near Cracow, Poland. They have been worked

for centuries and are of great extent. The chief deposits of salt in the United States are in New York, Michigan, Ohio, West Virginia, Pennsylvania, Illinois, Kansas, Louisiana and Texas. Some of the New York beds are 250 ft. thick. On Avery's Island (Petit Anse) near Iberia, La., is a deposit covering 144 acres.

Salt is obtained by mining rock salt and purifying it, by the evaporation of sea water and water from salt lakes, and by dissolving the rock salt which is at a great depth, and evaporating the brine. Wells are sunk into the deposits; then water is caused to flow over the salt and dissolve it. The brine is then pumped out and evaporated. There are two methods of evaporation—that in the open air and that by artificial heat. Salt used for culinary and dairy purposes is purified and refined to the highest degree. Rock salt contains more or less impurities. New York and Michigan are the leading states in the Union in the production of salt, but Ohio, Pennsylvania, Kansas, Utah, Louisiana and several other states produce large quantities, the entire yearly output amounting to over 20,000,000 barrels. Salt is also imported from Great Britain, Russia, Germany and several other countries.

Besides its use for seasoning food and preserving meats, salt in small quantities is fed to stock. It is also employed in the manufacture of glass, for glazing the cheaper grades of pottery and in extracting gold from ore.

Salt Lake City, Utah, capital of the state and county seat of Salt Lake Co., on the Jordan River, which connects Utah Lake with Great Salt Lake, and on the Union Pacific, the Oregon Short Line, the Western Pacific, the San Pedro, Los Angeles & Salt Lake, the Denver & Rio Grande and other railroads. The city has an altitude of 4350 ft. above sea level and is situated in the valley of the Great Salt Lake at the base of the Wasatch Mountains. Salt Lake City is the headquarters of the Latter Day Saints, or Mormons (See MORMONS). The city is of marked importance as a trade distributing center for a vast mining, agricultural and stock-raising country.

PARKS AND BOULEVARDS. Salt Lake covers an area of 51 sq. m., and the city contains handsome residences, wide streets and well-kept lawns. The streets are laid out according to the plan of Brigham Young, with ten acres to each city block. Streams fed from mountain sources and rows of trees line the thoroughfares. Some of the finest residence streets extend eastward from the Temple to Ft. Douglas, a beautiful military suburb. The city has a fine system of electric railways, and interurban lines extend through the surrounding valley. Saltair Beach on Great Salt Lake, famous for its bathing and large Moorish pavilion, is reached by a 30 minutes' ride from the center of the city. Lagoon Resort, 16 m. from the city by trolley, also affords fresh-water amusement. The municipal park system includes Liberty Park, with an area of 100 acres; Pioneer Park, near the business district; and several smaller parks. City Creek, Parley's and the Cottonwood Canyons, sources of the water supply of the city, are also improved as parks. Wandamere and Majestic parks are in the city, and there are also hot sulphur springs within the city limits.

PUBLIC BUILDINGS. The chief public buildings include the city and county building, Federal Building, Capitol, Y. W. C. A., Mining Exchange, Masonic Temple, the Alta, Elks, University, Ladies Literary and Commercial clubs, 12 banks, the Boston, Newhouse, Kearns and Walker Bank buildings, the Utah, Kenyon, Semloh, Newhouse, Grand, Cullen, Moxum and Wilson hotels, theaters and business blocks.

The most prominent buildings, rich in points of interest, are located in Temple Square. The great Temple, begun in 1853 and finished in 1893, was built at a cost of $4,000,000. The highest of the six spires is surmounted by a copper statue of the angel Moroni. The Tabernacle is elliptical in shape, 250 ft. long, 150 ft. wide and 70 ft. high. It is noted for its acoustics and large organ of 5000

pipes. The Assembly Hall has an assembly auditorium which seats 3000. The Lion, Gardo and Beehive houses were built by Brigham Young as places of residence, the beehive being the symbol of the industry of the Mormon settlers. Salt Lake contains St. Mary's (Catholic) and St. Mark's (Episcopal) cathedrals and about 70 church edifices and mission buildings.

INSTITUTIONS. The leading educational institution is the University of Utah, chartered in 1850 as the University of the State of Deseret. Other educational institutions include the Latter Day Saints University, St. Mary's Academy, All Hallows College, Rowland Hall Academy (Episcopal) and Westminster College (Presbyterian). A state art institute and a public library are located here. The public schools of the city are of high efficiency. Two new high school buildings cost $1,800,000.

INDUSTRIES. Salt Lake City is the center of the business interest of the state, and the city is one of the important shipping points of the vast West for sheep, agricultural products and minerals. About one-fifth of the metal mining operations of the country are directed from the city. The manufacturing establishments include flour mills, foundries and machine shops, railroad repair shops, salt works, knit-goods factories, sugar refineries, cement works, mattress factories and confectionery factories. Gold, silver, copper, lead, zinc and coal are successfully mined.

HISTORY. The history of Salt Lake is interesting. The Mormon pioneers arrived July 24, 1847. President Brigham Young approved the site, and the place was named the City of the Great Salt Lake. The first finding of gold in 1848 and the outfitting of the gold seekers who went to California overland added to the prosperity of the Mormon settlers. In 1850 the population was 6000. A city charter was granted in 1851. Population in 1920, U. S. census, 118,110.

Salt Lake, Great. See GREAT SALT LAKE.

Salt Lakes. See LAKE.

Salt"pe'ter, or Ni'ter, a compound, chemically known as potassium nitrate, which is found upon the surface of the earth in some regions as a result of the oxidizing of organic matter containing nitrogen. The action is due to a specific bacterium and never takes place in its absence. Saltpeter is artificially prepared by the action of potassium chloride upon sodium nitrate, or Chile saltpeter. Since it supplies oxygen readily it is used in the manufacture of gunpowder and fireworks. It is also useful in the preserving of food and in many medicines. Mixed with salt and sugar, it is extensively employed in curing meats and especially in the preparation of hams and bacon. Chile, or Peruvian, saltpeter, so-called because it is found in great quantities in Chile and Peru, is a white, salty solid used in the manufacture of ordinary saltpeter. Chemically, it is sodium nitrate. Since it takes up moisture it is not used in the manufacture of gunpowder directly. It is in common demand as a fertilizer.

Salt Sea. See DEAD SEA.

Salts, Smelling, a toilet preparation composed usually of carbonate of ammonia mixed with some sweet-scented volatile oil or perfume and used as a restorative by people afflicted with faintness. The ammonia by its pungency constitutes the restorative property, and the perfume is added to make it agreeable.

Sal"vador'. See CENTRAL AMERICA.

Salva'tion Army, a religious organization founded in England by William Booth in 1865 (See BOOTH, WILLIAM). His aim was to evangelize the great mass of people whom the ordinary church organization does not influence. The name Salvation Army was adopted in 1878, but General Booth began open-air meetings in 1865, when the movement originated. The Army has a military organization, while such methods are used as will attract attention: street meetings, marching to the accompaniment of band music, the use of popular airs, to which sacred words are adapted, etc. The members of the organization wear uniforms and have military titles, such as colonel,

captain, major, lieutenant; the local districts are provinces, posts, etc.; the chief Army paper is *The War Cry*.

The Army was organized in the United States in 1880, where it has made wonderful progress, and where charitable activities of the organization are almost numberless, especially in the slum districts in the large cities. The Army in the United States owns real estate to the value of over $4,000,000. In September, 1910, it reported 896 corps and outposts, 6104 local officers and bandsmen, an indoor attendance for the year of 8,248,497 and a company attendance of 912,467. In that year 1,961,677 beds and 144,255 meals were supplied, indicating the vast scale on which the Army serves the poor, and its recognition of the importance of aiding the body as well as the soul. The operations of the organization are now world-wide, being carried on in 56 countries and colonies. A division of the Army in America occurred in 1896, when an organization called the Volunteers of America was founded. The present head of the Army is Bramwell Booth. See VOLUNTEERS OF AMERICA.

Salvini, *Sahl ve' nee,* **Tommaso (1829-1916),** an Italian tragedian, born at Milan. He joined the company of Adelaide Ristori in 1847, and later played with Edwin Booth in New York City. His career was successful both in England and America. Among his rôles were Macbeth, Othello, King Lear, Conrad in Giacometti's *La Morte civile,* Saul in Alfieri's *Saul,* Egisto in Alfieri's *Merope,* Œdipus in Niccolini's *Œdipus,* and Paolo in Pellico's *Francesca da Rimini.*

Sama'ria, a city of Palestine, built by King Omri in the ninth century B. C. as the capital city of the Kingdom of Israel. Situated on a hill 600 ft. in height, with fertile valleys to the north and east and the blue Mediterranean to the west, Samaria occupied a site remarkable for strength and beauty. Here the Israelitish monarch reigned for 200 years, until Samaria was captured by Sargon, King of Assyria, and the ten tribes were carried away into captivity (722 B. C.). The Samaria of the New Testament was a splendid city, rebuilt by Herod the Great, to whom it had been granted by the Emperor Augustus. The ancient city is at present represented by a hamlet called Sebusteh.

Samar'itans, a mixed people derived from the colonists whom the King of Assyria sent to inhabit the land of Samaria (See SAMARIA), after the ten tribes were carried away into captivity. Drawn from various nations of the East, these colonists brought idolatrous practices with them, but later endeavored to combine a formal worship of God with their own rites. After the return of the Jews from the Captivity, when the Mosaic regulation concerning mixed marriages was enforced, Manasseh, a Jewish priest who had married a Samaritan, headed a secession to Shechem. The people built a rival temple on Mt. Gerizim, learned the Mosaic ritual and adopted the Pentateuch and the books of *Joshua* and *Judges* as their sacred books. Their temple was destroyed about 120 B. C. by John Hyrcanus. The Samaritans now number about 100 persons, who live at Nablus (Shechem). They preserve an ancient copy of the Pentateuch, celebrate the annual feast of the Passover on Mt. Gerizim and observe, with some variations, the Mosaic Law.

Samo'an Islands, or **Samoa,** a group of 14 islands of the Southern Pacific lying about 3500 m. s.w. of the Hawaiian group and about the same distance east of Australia. They were formerly called Navigators' Islands. They are 4200 m. from San Francisco. The largest islands of the group are Savaii, Upolu and Apolima, mandatories of New Zealand, and Tutuila and Manua, which are possessions of the United States. The climate is tropical and the vegetation is rich and varied. Copra, the dried meat of the cocoanut used in the production of cocoanut oil, is exported in large quantities, and as the demand for this oil in soap making always exceeds the available supply, the trade is a profitable one. The islands are frequently visited

by destructive hurricanes, and on many occasions, notably in 1889, tidal waves have wrought great damage to life and property.

The natives of Samoa are Polynesians and are of a high type of intelligence. In the islands belonging to the United States they maintain a native guard and band, trained by an officer of the United States navy. Especial attention has been given to eradicating disease, and in the efforts of the United States Government the natives have heartily co-operated. The Samoan Islands were divided between the United States and Germany in 1900. Their total area is 1100 sq. m., and the population is 39,800. Germany lost her Samoan possessions in 1919. The Samoan Islands form a literary landmark as the home of Robert Louis Stevenson during his later years.

Sa'mos, an island off the western coast of Asia Minor. It is 27 miles long and has an area of 181 sq. m. Its mountainous surface is covered with forests and, though little mining is carried on, it contains marble quarries, zinc, lead and ore. The exports consist of grapes, wine, oil, mastic, hides and carob beans. It is a possession of Turkey, and since 1832 has had a semi-independent government.

Samp'son, William Thomas (1840-1902), an American naval officer, born in Palmyra, N. Y., and educated in the United States Naval Academy at Annapolis, where for three years after his graduation he was an instructor. In June, 1864, he became executive officer of the *Patapsco,* of the Charleston Blockading Squadron, and for ten years after the Civil War he was part of the time at sea and part of the time an instructor at Annapolis. In 1879 he took command of the *Swatara,* later had charge of the Naval Observatory and from 1886 to 1890 superintended the Naval Academy, raising it to a high degree of efficiency. As captain, he was assigned to the steel cruiser *San Francisco* in 1890, and three years later became chief of the bureau of ordnance, aiding greatly in the building up of the navy and becoming a world authority on ordnance. In March, 1898, he was president of the *Maine* court of inquiry, and the following month, having been made acting rear-admiral, he commanded the fleet in Cuban waters. Sampson was promoted to the rank of commodore on July 3, 1898, the same day that his fleet destroyed Cervera's off Santiago, though he himself was absent. Following the war he was a Cuban commissioner, became rear-admiral and commanded the Boston (Charlestown) navy yard. He retired Feb. 9, 1902.

Sam Slick. See HALIBURTON, THOMAS CHANDLER.

Sam'son, an Old Testament character remembered especially as a man of wonderful bodily strength. He was the son of Manoah, of the tribe of Dan, and was reckoned one of the judges of Israel. The story of Samson is recorded in the book of *Judges.* Milton made his suffering the theme of his poem, *Samson Agonistes.*

Sam'uel, the last of the judges of Israel, and the first of the order of prophets, a member of the tribe of Levi. He was early consecrated by his mother, Hannah, to the service of the Lord, and the boy received his religious training under the priest Eli at Shiloh. About 20 years after Eli's death Samuel became judge of Israel; during his administration he restored the neglected worship of Jehovah. In his old age, yielding to the entreaties of the Israelites, he anointed Saul King of Israel, thus bringing about the establishment of a monarchy. He was also the first of a long line of prophets, the special representatives of Jehovah.

Samuel, First and Second, the two books of the English Bible preceding the Books of *Kings.* In the Hebrew manuscript they are not divided. Although the books of *Samuel* were not written by Samuel, nor is he the principal subject of the narrative, the name is not wholly unsuitable. The early part of the first book alone is chiefly devoted to Samuel, but the two kings, Saul and David, whose reigns occupy the remainder of the narrative, were both anointed by

Samuel. The books of *Samuel* are a part of the historical group of the Old Testament. Their authorship is unknown. See BIBLE, subhead *The Old Testament.*

San Angelo, *An' ha lo,* **Tex.,** a city and the county seat of Tom Green Co., about 236 m. n.w. of Austin and 270 m. n. of Fort Worth, on the forks of the three Concho rivers and on the Gulf, Colorado & Santa Fe and the Kansas City, Mexico & Orient railroads. The altitude is 1956 ft. above sea level, and the city is prominently known for its healthful climate, especially for those afflicted with pulmonary and chronic diseases. A number of mineral wells are found in the vicinity. San Angelo is the center of a vast, fertile agricultural region, in which quantities of fruit, celery and general farm products are grown. The chief industries are farming and stock raising, and the city is one of the largest wool-shipping centers in the United States. The pecan industry averages from $40,000 to $75,000 annually. The industrial establishments include foundries and machine shops, a cotton-seed-oil mill, cotton-compress works and several ice factories. Population in 1920, 10,050, including suburbs, the population is about 14,000.

San Anto'nio, Tex., largest city of the state and county seat of Bexar Co., 80 m. s.w. of Austin, on the San Antonio River, at the mouth of the San Pedro River, on the Missouri, Kansas & Texas, the Galveston, Harrisburg & San Antonio, the International & Great Northern, the San Antonio & Aransas Pass and other railroads. The city has an elevation of about 610 to 750 ft. above sea level and is a noted health and winter resort, many northern people having winter homes here. The San Antonio River has a winding course, and with its tributary, the San Pedro, divides the city into three main portions. This river is spanned by a large number of bridges and culverts. San Antonio is the center of a large farming and live-stock raising section, and the city has considerable commercial activity.

PARKS AND BOULEVARDS. San Antonio is of a distinctly Spanish type, and the city is singularly foreign and picturesque in appearance, there being hardly a straight street in the city. Houston Street is the main street-car thoroughfare. The city contains about 21 parks and plazas. Brackenridge Park, a natural tropical forest of 230 acres, lies in the north limits of the city, opposite Ft. Sam Houston, a mammoth brigade post, one of the largest in the United States. Other parks in the heart of the city include Travis, which contains a soldiers' memorial monument, Alamo, Main, San Pedro, Military and Milam, each of them beautiful with tropical trees, shrubs and flowers. Texas independence is celebrated each spring in a great public festival, known as the Fiesta San Jacinto and Battle of Flowers. Alamo Heights, West End and Hot Sulphur Wells, Palm Heights, Collins Gardens are the residential suburbs of the city.

PUBLIC BUILDINGS. The prominent buildings include the beautiful Federal Building; county courthouse of red Texas granite; city hall of artistic merit; the Travis Club, an eight-story building beautifully equipped, one of the handsomest clubhouses in the South; a handsome market house which has over it an auditorium which seats 4000 people; the Moore, Bedell, Gunter, Gibbs and Frost office buildings; two great department stores: Wolff & Marx Company, occupying the new Rand Building of eight stories; Joske Brothers Company, occupying a four-story building; and the Stowers Furniture Company, occupying an eight-story building. The principal hotels are the Gunter, the St. Anthony and the Menger; the Hutchins, the Crockett and the Bexar are also fine hotels. The Hot Wells Hotel and Bath House and the Harlandale Baths with hot sulphur baths are popular resorts. The famous Alamo is one of the five missions that still stand in and near San Antonio (See ALAMO). The other missions are Mission Concepción de Acuna, the Mission San José de Aguayo, Mission San Juan de Capistrano and the

Mission San Francisco de la Espada. The San Fernando Cathedral is another interesting survival of the ancient days, and contains some historic and beautiful paintings. San Antonio is the seat of a Catholic see and an Episcopal bishopric. There are about 60 churches.

INSTITUTIONS. Among the educational institutions are the San Antonio Female College (Methodist), Peacock Military School, St. Mary's Hall (Catholic), West Texas Military Academy, St. Louis College and Our Lady of the Lake Academy. There are about 37 public schools and various schools for negroes. The benevolent and charitable institutions include the Santa Rosa Infirmary, a fine city hospital, homes for destitute children, St. Joseph's Orphan Asylum, St. Francis Home for the Aged and a House of Refuge. The Park Terrace Sanitarium has a beautiful location overlooking the city.

INDUSTRIES. San Antonio is an important cotton market and the center of one of the most important stock-raising interests in the Southwest. Truck gardening is also conducted on an extensive scale, the products being shipped to the Northern markets. The onion crop, shipped annually through San Antonio, has a gross value of $1,500,000. Large ostrich farms are located near the city. The manufacturing establishments include ironworks, foundries, machine shops, flour mills, cotton presses, cotton-seed-oil mills, chili factories, cement works and broom factories.

HISTORY. The great rivalry for the possession of Texas between Spain and France caused the first Spanish settlement to be made here. The beginning of the city dates, however, from 1718, when the presidio or garrison of Bexar was founded under the direction of Martin de Alarcón. Franciscan missions followed, and, in 1730, 15 families were brought from the Canary Islands and a pueblo or village rapidly grew up. During the long war of the revolution of Mexico against Spain the city witnessed many scenes of strife and bloodshed. In 1836 occurred the revolt against Mexican invasion. Since the close of the Civil War the city has shown a marvelous development. Population in 1920, 161,379.

San Bernardino, *Ber" nar de' no,* **Cal.,** a city and the county seat of San Bernardino Co., about 60 m. e. of Los Angeles, on the Atchison, Topeka & Santa Fe, the Southern Pacific, the San Pedro, the Los Angeles & Salt Lake and other railroads. It is connected with Los Angeles and other points in the vicinity by interurban electric lines. The city lies in a valley at an altitude of about 1050 ft., a region noted for its beautiful scenery, healthful climate and medicinal springs. There are three parks of 55 acres. Farming, mining and stock raising are engaged in. Hay, fruit, grain and alfalfa are the chief crops. There are foundries, machine shops, lumber mills and a box factory. Among the public buildings are a fine courthouse and a public library. San Bernardino, popularly known as the "Gate City of Southern California," was founded in 1851 by a company of Mormons, not far from the site of an early mission of the same name. It was incorporated in 1854, deprived of its charter in 1861 and rechartered in 1863. Its present charter, adopted in 1905, provides for the initiative, referendum and recall. Population in 1920, 18,721; including suburbs, about 25,000.

Sand, a loose mineral mass, formed by the action of natural and artificial agencies operating upon the surface of rocks and reducing them to fine particles. Sand, therefore, varies in composition, although only a limited number of rock-forming minerals occur frequently in sand deposits. Quartz and feldspar are the chief constituents. Gold, copper, iron, tin, platinum and other valuable metallic ores frequently occur in the form of sand or mixed with that material. A large part of the earth's surface is covered with sand; it is an important constituent of soils; and occurs in abundance in arid regions, on the shores of the sea and along the courses of streams. There are numerous economic uses of sand. It is used in making ce-

ment, mortar and bricks, for filtering, polishing and scouring, for making molds in foundries, in the manufacture of glass and for various other purposes.

Sand, George (1804-1876), the pen name of the French novelist, Amandine Lucile Aurore Dudevant. She was born in Paris and was educated in the home of her aristocratic grandmother and at a Parisian convent, and in 1822 was married to Casimir Dudevant, with whom she lived eight years. After 1829 she was chiefly in Paris, painting fans and snuffboxes and doing fancy work, and later serving as literary apprentice to Delatouche, editor of the *Figaro*. With Jules Sandeau, also on the staff of the paper, she wrote novels, and in 1832 published *Indiana,* an independent work. Others followed and were received by the public with acclaim. Putting into practice her theory that passion should serve as a guide to conduct, her life became a succession of friendships, more or less intimate, of partings and of heartbreakings. Those whose influence was the most permanent were Alfred de Musset and Chopin. She wrote novels of revolt and pleas for socialistic revolution; later in life she turned to stories sweet with the simplicity of rustic life. Among the best and most typical of her writings are *Valentine, Lélia, Indiana, Consuelo, The Countess of Rudolstadt, The Devil's Pool, The Little Fadette* and *The History of My Life.*

San'dal, a covering for the soles of the feet, fastened on by means of straps which pass over the instep and around the ankle. Sandals were designed to protect the bottom of the foot from extremes of surface heat and cold. They have been worn by nearly all primitive peoples and are used extensively by Orientals at the present time.

San'dalwood", an East Indian tree of the Santalales Family, noted for its fragrant, close-grained heartwood. This wood is very hard and of a reddish-yellow; its odor, which is agreeable, has the added value of being disagreeable to moths; hence sandalwood is employed in making chests, fans, fancy boxes and ornamental carved work. Incense sticks, which are also prepared from it, have the ability to retain their powerfully sweet fragrance for an indefinite time. Sandalwood is sometimes called redwood.

Sand Blast, a contrivance for cutting, engraving and cleaning stone, metal, glass, etc., by the force of a stream of sharp sand propelled against them either by steam or air at high pressure. It consists of a hopper to hold the sand, which is fed into a tube, where it meets a stream of air from an air compressor or blower, or a jet of steam from a boiler, either of which may be employed to propel the sand with great force. The current of air or steam can be easily controlled and regulated by valves. When a design is to be cut on glass, a stencil is made, usually of rubber, and those parts left exposed are subjected to the sand blast, which etches or engraves them very quickly, but if there is no covering, the glass is simply frosted over its entire surface. Structures of steel and stone are rapidly cleaned with the aid of a small steam boiler and the sand-blast device. It is also extensively used in foundries for the purpose of cleaning castings that are too large to be handled by tumbling. Goblets, various household utensils of glass and glass globes, as well as plate window glass, are etched or engraved by the sand-blast method.

Sand Bur, any herblike plant growing in light, sandy soil and whose fruit is enclosed in a dry, prickly shell. The principal sand burs are: the clotweed, the sand bur of the New England States, a coarse weed of the Composite Family, having rough, divided leaves with saw-toothed margins, green flowers in a spherical head, and fruit a two-celled bur; bur grass, found on sandy soils from New Jersey to Wisconsin, a dry, jointed member of the Grass Family having spikes of nodding flowers which latter develop into particularly troublesome burs; the nightshade sand bur, more common in the West, a prickly-stemmed, erect herb of the Nightshade Family, having starry, blue, five-lobed

flowers; and the cocklebur, also a member of the Composite Family and differing very little from the clotweed. These burs are all troublesome, since their tiny, hooked spines become attached to clothing, to animals' fur, and even to birds' feathers, and are difficult to remove. They work great harm in the wool of sheep, where they injure the quality of the wool and even cause irritation of the skin.

Sand Eel. See EEL.

Sand'erling, a bird of the Snipe and Plover Family. It is a small shore bird, about eight inches long; the upper parts are spotted and speckled with black, rusty and white; the under parts are white. The Sanderlings breed in Arctic and sub-Arctic regions, the nest being made in a depression in the ground, and lined with grass and leaves. It contains four brown-spotted eggs. These little birds may be seen in small flocks on the shores of lakes and ponds, where they follow the waves up and down the beach. They are almost everywhere in summer, and they winter from Texas and California to Patagonia.

Sand'hill" Crane. See CRANE, subhead *Sandhill Crane.*

San Diego, *De a' go,* **Cal.,** a city, port of entry and county seat of San Diego Co., 126 m. s.e. of Los Angeles, on the Pacific Ocean, 16 m. from the border of Mexico, and on the Atchison, Topeka & Santa Fe, the San Diego & Southeastern and the San Diego & Arizona railroads. The San Diego Bay, which forms one of the finest harbors in the world, has a total area of 22 sq. m. The city is a regular port of call for the Pacific Coast, the North Pacific, the American-Hawaiian, the Campania Naviera del Pacifico and other lines of steamers. Point Loma, a promontory 400 ft. above sea level, protects the harbor entrance on the west. The Federal Government has made improvements which maintain a uniform depth of the entrance channel and the city is the first Pacific port of entry from the Panama Canal. San Diego has one of the most equable climates in the world, and the industrial interests center around the cultivation of fruit, especially raisin grapes and citrus fruits. The city is an all-the-year-round tourist resort and possesses many attractive points of interest and beautiful resorts, which include La Jolla, Coronado, Point Loma, Del Mar, Chula Vista and Grossmont.

San Diego contains about 50 m. of boulevards and 70 m. of street railways. Interurban electric lines connect the city with the near-by towns. Balboa Park of 1400 acres, upon which great expenditures have been made for holding the Panama-California Exposition for one year beginning January, 1915, is in the heart of the city. Among the handsome hotels are the U. S. Grant, costing $2,000,000, the Lanier, the Brewster and the new San Diego. The Hotel Del Coronado, across the bay, is one of the most renowned hotels in the United States. Among many noteworthy buildings are the Carnegie library, the Timken, American Bank, Union and Marston buildings, Masonic and Elks' temples, county courthouse, about 52 handsome churches, a large number of banks, several theaters, including the New Spreckels, costing $1,000,000, and many stately private residences. The educational advantages of San Diego are exceptionally fine and include a state normal school, one of the best equipped in the state; a high school, costing $225,000; a polytechnic high school and a number of public schools. In addition to the public schools, the city contains Our Lady of Peace Academy for girls, boys' military school, two business colleges and a number of private institutions, including the Raja Yoga Academy (Theosophical).

San Diego has important industrial interests. Huge rafts of lumber are sent to this port and converted into use in mines and into building material. Among the manufactured products are flour, brick, brooms, cigars, confectionery, olive oil, pickled olives, sardines, furniture, auto tires, citrus washing powder, smoking tobacco, gasoline and marine engines and onyx articles. There are also heavy shipments of coffee, spices

and dried fruits. San Diego County is now known as the "Gem County of California," producing large quantities of semiprecious stones. San Diego (St. James) was the first place settled in California, and Father Junipero Serra first planted the cross here in 1769. This part of the place is now known as Old Town and is about four miles north of the business part of the city. The present San Diego was founded by Alonzo Erastus Horton in 1867. The town was incorporated in 1872 and made a port of entry in 1873. The city has the commission form of government. Population in 1920, U. S. census, 74,683.

Sand'pi"per Family. This family contains many species of shore birds, varying in size and habits. They have unusually long bills and legs, long and pointed wings and a more or less spotted plumage. The best-known species is the spotted sandpiper, or tip-up. It is about the size of the robin; the upper parts are greenish-olive with faint marks of a darker color; the under parts are white with rounded, dark spots on the abdomen; and the wing feathers (secondaries) are tipped with white. When the wings are open they show a white line along the middle. The nest is placed on the ground either in a tuft of grass or under a bush and is lined with leaves and grass. It contains four eggs spotted with brown and lilac. This little sandpiper is one of the most familiar birds in the meadows and along the river banks, where its well-known "peet-weet" note and teetering motion when it alights or is alarmed render it easy of identification. Its tipping motion has given it the name of "teeter-tail."

Sand'stone", a rock composed of grains of sand cemented together by some such mineral as clay, limestone, silica or oxide of iron. Those sandstones which contain little cementing material are soft; those with a considerable amount of cementing material are hard and durable. Sandstones contain practically the same minerals as sand, quartz predominating, feldspar occurring in large quantities, and white mica being present in smaller proportion. In color they may be brown, yellow, red, gray or white. Sandstone occurs in great abundance and variety in many localities, and is obtained by mining or quarrying. The harder varieties are extensively used for building purposes, and those which are softer, if free from oxide of iron, are employed in the manufacture of glass and pottery. Certain grades are useful for grindstones and whetstones. The chief sources of commercial supply in the United States are the Connecticut Valley, Ohio, New York and Arkansas.

Sandus'ky, Ohio, a city, port of entry and county seat of Erie Co., 56 m. s.w. of Cleveland and 53 m. s.e. of Toledo, on the south shore of Sandusky Bay, 5 m. from Lake Erie and on the Lake Shore & Michigan Southern, the Baltimore & Ohio, the Lake Erie & Western and the Cleveland, Cincinnati, Chicago & St. Louis railroads. The city is built on rising ground and commands a beautiful view of the bay. Electric-car lines enter the city from Cleveland, Norwalk, Toledo and other places. Cedar Point, Put-in-Bay, Kelley's Island, Middle Bass, Gibraltar and Pelee Islands are all noted fishing resorts and easy of access. Sandusky has steam connection with the principal ports on the Great Lakes and considerable trade with Canada.

The excellent transportation facilities have made Sandusky of commercial importance. Shipbuilding is one of the chief industries. There are also glass and cement works, basket and crate factories, cooperage works, machine shops, window-glass and underwear factories, electric-dynamo and steam-turbine works, structural-iron works and furniture factories. The city has an extensive trade in coal, fish, fruit, ice and soft drinks. Sandusky makes the greater part of the crayon used in the United States and also has an export trade. Among the notable buildings and institutions are a state soldiers' and sailors' home, the government building and a bonded warehouse. A United States fish

hatchery is located at Put-in-Bay and a state hatchery at Lakeside. Sandusky was settled in 1817 and incorporated as a city in 1845. Population in 1910, 19,989. In 1920, 22,897.

Sandy Hook, a narrow, sandy peninsula on the coast of New Jersey about 15 m. south of the southern end of Manhattan Island. It is about 6 m. long and separates Sandy Hook Bay from the ocean. It forms the outer boundary of New York Harbor, and on the northern extremity there is a lighthouse 90 ft. high. Ft. Hancock is also on this peninsula.

San'ford, Me., a city of York Co., 35 m. s.w. of Portland, on the Mousam River and on the Boston & Maine Railroad. Its manufactures include dress goods, shoes, carriage robes, plush, worsted cloth, yarn, blankets and other articles. The Mousam River affords water power for many mills. The town was settled about 1740. Sanford was first incorporated in 1768. Population in 1920, 10,691.

San Francisco, *Fran sis' ko,* **Cal.,** the metropolis of California and the Pacific Coast, tenth city in size in the United States, situated on the north end of a peninsula 20 m. long and 6 m. wide separating San Francisco Bay from the Pacific Ocean, 804 m. s. of Seattle, 482 m. n.w. of Los Angeles and 2357 m. w. of Chicago. San Francisco is the terminus of the Atchison, Topeka & Santa Fe, the Western Pacific, the North Western Pacific and the Southern Pacific railroad systems and their branches. Only one railroad, the Southern Pacific, actually enters the city. The other railroads have their terminals across the bay, and are connected with the city by ferry. The entrance to the bay is through the Golden Gate, a waterway, or harbor, 5 m. long and about 1 m. wide at its narrowest point, with a strikingly beautiful and picturesque setting. San Francisco Bay, comprising 250 sq. m., is one of the largest landlocked bays in the world. The two principal rivers of California, the Sacramento and San Joaquin, flow into San Francisco Bay. The islands in the bay are part of the municipal district, but several are controlled by the United States Government. One of these is Mare Island, the naval station of the Pacific in San Pablo Bay, 30 m. distant from the city, where United States vessels go for repairs and coaling. Alcatraz, a fortified island and military prison, is opposite the Golden Gate.

San Francisco is preeminently a commercial city and has all the advantages of location possessed by any of the great commercial cities of the country. There are over 8 m. of wharves and piers. On the north section of the water front are located the piers of the Pacific Coast, the Oceanic, the Kosmos and the American-Hawaiian Steamship companies. The latter line maintains service between San Francisco and New York City and various Atlantic ports. Coastwise steamers also reach Puget Sound for Washington and Idaho. The trade with China, Japan and the Australasian Islands is conducted by several lines of steamers, British, German and Japanese, and there is keen competition for the Pacific trade. San Francisco shows few vestiges of the ruin wrought by the great earthquake and fire of April, 1906. A new city of imposing modern structures now occupies the ground where formerly stood buildings of heterogeneous construction. The site of the city is very hilly, and it is this feature which gives the city its striking sky line. Nob Hill and Pacific Heights are among the eminences which give unbroken views of the city and bay. The highest points in the city are Twin Peaks. The city has an abundance of pure water, and the future supply is being safeguarded by bringing water from the Sierra Mountains at a vast expenditure. Electric street lines traverse the city with a network of routes, and ferry and interurban lines connect with the many points of interest across the bay and down the peninsula to the south. The first municipal street railway, the Geary street line, was placed in operation on Dec. 27, 1912.

PARKS AND BOULEVARDS. Market Street is often called the backbone of the city.

Montgomery, Pine, Sansome, Bush, Third, Kearny, Post, Sutter and Geary streets and Grant Avenue are among the prominent business streets. There are 22 small parks, besides Golden Gate Park, which, with 1013 acres, is the pride of the city. This park has a museum (modeled after an Egyptian temple, which contains a rich Oriental collection) and a fine conservatory. Strawberry Hill, which rises 426 ft. above sea level, is in the center of the park. There is also a beautiful Japanese tea garden. The ocean forms the western boundary of this park, and a wide boulevard runs along the beach. The Cliff House, situated at the west of the park on a rocky cliff, is an attractive resort, and from it sea lions may be seen upon the noted "Seal Rocks," which are frequented by the sea lions all the year. The famous Sutro baths adjoin the Cliff House and form one of the finest enclosed baths and winter gardens in the world. The Presidio Reservation comprises 2000 acres of parklike expanse and is one of the great military posts of the country. Many beautiful residences, surrounded by semitropic flowers and trees, are in this vicinity. Mt. Tamalpais, one-half mile high, a popular resort across the bay in Marin County, is reached by a scenic railroad. Yerba Buena (Goat Island) in the bay is a naval-training station, where seamen are trained for service in the United States navy. San Francisco's new Chinatown covers an area of about 15 blocks in the heart of the city. Several of its bazaars are said to be among the finest in the world. The Chinese merchants represent an important part of the import commerce of the city.

Public Buildings. The most noteworthy buildings include the City Hall, the Public Library, and Exposition Auditorium and the Union Ferry Building. The California Development Board has an excellent agricultural and horticultural exhibit in this building. There is also the California State Mining Bureau of Mineral Exhibits. Other buildings are the Santa Marina, the headquarters of the California Fruit Canners' Association, and the Mills, Schilling, Crocker, Royal Insurance, Metropolitan, Continental, Kohl, Hibernia, Home Telephone, Phelan, Clunie, Foxcroft, Balboa, Hewes, Pacific, Sherman-Clay, Merchants' Exchange and New Appraisers' buildings, which are among the modern structures. The Federal Building, United States Mint, city hall, costing about $5,000,000, customhouse and subtreasury are attractions of the city. San Francisco has 150 hotels, which include the Palace, the St. Francis and Fairmont, which are sumptuously equipped. The Bank of California is the oldest banking institution in San Francisco. There are a large number of banks occupying handsome and substantial buildings. Among the theaters are the New Orpheum, Valencia, Van Ness, Princess, Cort, Columbia and American, which are modern playhouses. All religious denominations have handsome places of worship throughout the city. The Mission Dolores was founded in 1776 and is a place of much interest. Around this historic building the pueblo of San Francisco was founded. There is a new Y. M. C. A. Building costing $600,000.

Institutions. The leading educational institutions include a state normal school, a School of Mechanic Arts, endowed by James Lick, the Cogswell Polytechnic College, Wilmerding School of Art, many independent colleges and schools, a number of business colleges and about 98 grammar schools. There are also several high schools, and the law, medical, dental, chemical and other departments of the University of California, which is located in Berkeley, nine miles from the city. There are a number of public libraries and museums. The benevolent and charitable institutions include about 18 hospitals and a number of homes for the aged and for children.

Commerce and Industry. As a wholesale and jobbing business center, San Francisco ranks high. Among the industrial establishments are flour and cereal mills, fruit-canning works, chocolate and cocoa works, cordage plants,

beet-sugar factories, paint and oil works, boot and shoe factories, silk-manufacturing plants and hardware works. The Alaska salmon industry, with a large fleet of vessels, is an important one and aggregates many millions of dollars annually. The lumber business occupies a prominent place in the commerce of the city, and the distribution of petroleum, of which the state produces great quantities, is an important factor in the shipping interests. San Francisco is a large market for live stock, and heavy shipments of cattle are made to Oregon and Washington. Shipments of meat are also regularly sent to the Isthmus of Panama. Wine producing was one of the greatest industries of California, and the headquarters of many of the largest distributors were in San Francisco. There is an extensive dry dock at which battleships, cruisers and steel vessels have been constructed.

History. A military post, or Spanish presidio, was founded near the northern end of the peninsula in 1776. At the beginning of the Mexican War in 1846 the region was taken possession of by the United States. In 1848 gold was discovered at Sutter's Mill, near Sacramento, and San Francisco became the center of remarkable enterprise. In 1860 mail communication was established with the East by pony express. From 1859 to 1877 was the "silver era" of the city, which was a great stimulus to its growth. In 1876 railway connection was made with Los Angeles. In 1894 the Midwinter Fair was held in Golden Gate Park. The increased trade with the Orient, created by the control of the Philippines by the United States in 1898, has greatly added to the exports. The disaster of 1906 marked the beginning of a new period and has made it possible to modernize the city, which justly lays claim to being one of the most up-to-date cities of the world. The Panama-Pacific International Exposition was held in San Francisco in 1915 to celebrate the opening of the Panama Canal. Fully $17,000,000 was expended but the enterprise proved successful both from a financial and artistic aspect. The beautiful Palace of Arts remains as a permanent memorial of the exposition glories. Population in 1920, 506,678.

Sang'ster, Margaret Elizabeth (Munson) (1838-1912), an American author and writer, born in New Rochelle, N. Y. She was married to George Sangster in 1858. She began her editorial work in 1871, on *Hearth and Home,* and later was connected with the *Christian at Work,* the *Christian Intelligencer, Harper's Young People, Harper's Bazar,* the *Christian Herald,* the *Ladies' Home Journal* and the *Woman's Home Companion.* Her writings appealed especially to women and children, revealing broad sympathies, practical good sense and a helpful spirit. She wrote, among other works, *Poems of the Household, Home Fairies and Heart Flowers, Janet Ward, Good Manners for All Occasions, The Story Bible* and *Happy School Days.*

San'hedrin, the supreme judicial tribunal of the Jews. According to Jewish tradition it was instituted at the time of Moses. In the time of Christ it consisted of 71 members, including the president, or high priest. The members were drawn from the chief priests, the scribes (those versed in law) and the elders (heads of tribes and family associations). This tribunal had both civil and ecclesiastical jurisdiction and was the final court of appeal from all inferior courts, but questions concerning religion were peculiarly in its care. Its jurisdiction extended to all Jewish settlements and it could even summon the king before it. It could pass sentence of death, but this could be executed only by sanction of the Roman governor. Jesus was condemned by the Sanhedrin; Peter, Paul, John and Stephen were brought before it.

San Ildefonso, *Sahn Eel" da fon' so,* **Treaty of,** a secret treaty between Spain and France which was concluded Oct. 1, 1800. By this treaty Louisiana was given back by Spain to France in consideration of an agreement advantageous to the royal family of Spain rel-

ative to Tuscany. The purchase of Louisiana by the United States in 1803 was directly traceable to this treaty. See LOUISIANA PURCHASE.

San'itary Commission, United States, an organization formed soon after the beginning of the Civil War for the purpose of taking care of sick and wounded Union soldiers. Dr. Henry W. Bellows was elected president and Frederick Law Olmsted secretary. The funds of the commission were supplied by voluntary contribution, and gifts other than money to the value of $15,000,000 were donated. The work of the commission covered a wide range. It included the selection of camp sites, regulation of drainage, selection of food and supervision of cooking. Pavilion hospitals were established, to which the injured were transported in hospital cars from the battlefield. Hospital supplies, nurses, physicians and every other possible facility for relief were provided. Soldiers' homes were opened at convenient locations, to which men who became sick or weak on the march could be removed for temporary relief. A corps of army physicians, under an inspector-in-chief, made tours of inspection to the general hospitals and reported to the commission such data as it deemed useful to the medical department; and a bureau of statistics collected a large amount of valuable information relative to the sanitary conditions in the army and related subjects.

Sanitary Science, that branch of organized knowledge which has to do with the preservation of health through control of environment. To exercise that control over environment which shall preserve health, it is necessary to understand the laws of health and disease. Thus hygiene, the science of health, and sanitation are interdependent sciences. But, whereas hygiene is concerned primarily with the mechanism of the body and with those means of promoting health which lie within the organism, such as exercise, nutrition, and the prevention and treatment of constitutional diseases, or diseases arising largely from heredity, sanitation is concerned only with those external agencies which affect health and serve as mediums for what may be called environmental diseases, or diseases such as typhoid fever, diphtheria, etc., which attack the organism from without. Important among the external agencies which affect our physical well-being are soil, air and water, from which the body derives the elements needed for maintaining life and to which it returns its waste products; and the most important external condition in maintaining health is cleanliness.

In most countries laws are enacted which make compulsory the maintenance of sanitary conditions. In the United States boards of health are organized under the government for the purpose of protecting the public health. They are empowered by law to investigate conditions and to recommend prosecution of offenses, and are expected to suggest legal measures to meet new exigencies. The present health laws require that all cases of infectious and contagious diseases be reported to the board of health, and that such cases be quarantined until all danger of spreading the infection has passed. These laws also regulate to some extent medical and surgical practice; the construction of buildings, both private and public; conditions of public conveyances, such as railway trains, street cars and steamboats; control the method of garbage and sewage disposal and disposal of the dead; provide for the inspection of foods and regular examination of water supply of cities, for street cleaning, for institutions for the insane and hospitals for infectious diseases, for public baths and playgrounds; and are concerned with multitudinous other matters.

An important adjunct to the health boards are the state and municipal laboratories, where foods, drinks and drugs on the market are examined for any impurities they may contain. Manufacturers whose goods are found to be adulterated are prosecuted; if an examination of drinking water discloses germs of disease, or other impurities, a bulletin of

warning is issued to the users of it. Water-borne diseases are numerous; but a large percentage of them can be prevented by destroying the germ through boiling. Most diseases transferred through the agency of insects also are preventable, and it is the duty of the health officers to employ such means as may be in their power to destroy the breeding places of these pests and to suggest to the public other ways and means of combating them.

In many colleges and universities courses in sanitary science are offered. Such courses deal with the house as a factor in health, and give special attention to the modern conceptions of cleanliness and to the investigation of general sanitary conditions from a practical and scientific standpoint, with special reference to the needs of the household, the community and the school.

San Jacinto, *San Ja sin' to,* **Battle of** (Apr. 21, 1836), the decisive battle between Texas and Mexico. San Jacinto is in the southeastern part of Texas, and here Houston, with 800 Texans, fought 1400 Mexicans under Santa Anna. The battle soon became a rout and 630 Mexicans were killed, and 730, among them the commander, were taken prisoners. The Texans lost eight killed and 23 wounded. This victory meant the independence of Texas.

San Joaquin, *Sahn Ho" ah keen',* a river of California. It rises in the Sierra Nevada Mountains near the northeast boundary of Fresno County, flows southward to Millerton, thence northwestward, and unites with the Sacramento River near its mouth. Its length is 350 m., and it is navigable to Stockton. The Valley of the San Joaquin is celebrated for its fertility and is frequently called the "granary of California."

San Jose, *San Ho sa',* **Cal.,** a city and county seat of Santa Clara Co., 48 m. s.e. of San Francisco and 28 m. n.e. of Santa Cruz, on the Guadalupe and Coyote rivers, extending to San Francisco Bay, and on the Central Pacific, the Southern Pacific and other railroads. A line of steamers also connects with San Francisco Bay ports. San Jose is a popular health resort situated in the beautiful Santa Clara Valley, which is one of the largest fruit-growing regions of the state, and the city is an important fruit-packing and shipping point.

San Jose covers an area of 8 sq. m. and has an altitude from 84 to 125 ft. above sea level. The streets are wide and well shaded, and there are many handsome residences. The city contains St. James and City Hall parks. Alum Rock Park, a city reservation of 1000 acres, with 18 developed mineral springs, 7 m. east, is connected with the city by electric railway. About $110,000 is being spent for improvements which include a modern house for mineral baths. The principal public buildings include a Federal Building, which cost $250,000, a city hall, courthouse, a Y. M. C. A., Elks' Building, a public library and a Carnegie library, modern offices and bank buildings and about 32 churches. The educational institutions include the University of the Pacific (Methodist), the College of Notre Dame (Catholic), a state normal school, a public high school, two commercial colleges and a number of private schools. Among the benevolent and charitable institutions are the O'Connor and San Jose sanitariums, the Home of Benevolence, Pratt Home for the aged and the Notre Dame Institute for orphans. The San Jose Country Club and Golf Links are among the attractions of the city.

The industrial establishments include canneries, flour mills, pump works, horticultural-machinery works, grain elevators, woolen mills, basket and box factories, foundries, marble and granite works and fruit-packing works. The New Almaden quicksilver mine is located about 14 m. south of the city.

San Jose was first settled in 1777 and was the first Spanish pueblo in California. A city charter was granted in 1850. Population in 1920, 39,604.

San José Scale, a destructive pest of the Scale Insect Family in the order Hemiptera. It is particularly harmful to fruit trees and is especially apt to be

found upon the Japanese quince. A half-grown insect hibernates through the winter, reaches maturity in the early spring and begins egg laying. The young, which are only tiny yellow specks, may be seen wandering over the trunk during the month of June. Their activity is not of long duration, however, for in a day or less a colony establishes itself, exudes a gray, scaly wax, which forms an easily recognized patch upon the surface of the tree, and there passes the remainder of its existence. Four or more broods are produced during a single season; though the largest insects grow to be only about the size of the head of a pin, because of their great number and rapid multiplication, they become a serious pest. Their effect upon the tree is to rob it of its vitality, destroy its foliage and injure its fruit. Trees should be carefully examined for their presence, since, after these troublesome insects have gained a foothold, they are not easily exterminated.

The San José scale may be checked in its spread by the winter use of the prepared lime or sulphur sprays, which are purchasable with directions for use, or which may be made according to the directions in the article on Insecticide. The agricultural departments of all fruit-raising states have helpful bulletins upon the subject, which may be had upon application. In California, the San José scale is effectively fought with its natural enemy, the ladybird beetle. See Scale Insect.

San Juan, *San Hwahn',* **Battle of,** during the Spanish-American War, the one important land battle, fought in Cuba in July, 1898. On June 14, General Shafter, with 17,000 men, left Tampa, Fla., to aid the navy at Santiago. Landing to the east of that place, he there easily dispersed a small force, and then pushed on to the heights of San Juan and El Caney. After a stubborn attack the Americans captured these hills, July 2. During this engagement the Rough Riders won fame. See El Caney, Battle of; Spanish-American War.

Sank'ey, Ira David (1840-1908), an evangelist, born in Edinburgh, Pa. Having settled at Newcastle, Pa., he there joined the Methodist Episcopal Church. He became interested in the Young Men's Christian Association and while attending a convention of that organization in Indianapolis, in 1870, first met Dwight L. Moody, whom he joined in evangelical work as a baritone solo singer. His *Gospel Hymns* and *Sacred Songs and Solos* have been widely translated. Sankey eventually became blind.

San Marino, *Sahn Mah re' no,* a little republic embraced within the area of Italy, situated just south of the 44th parallel north, and surrounded by the two provinces of Forli and Pesaro e Urbino. It has an area of but 38 sq. m., or about one-half that of the District of Columbia. The little republic itself is one of the most ancient of Europe and occupies a mountainous region of the Apennines but a short distance from the Adriatic. At the summit of the peak, 2650 ft. above the sea, lies the little old walled town of San Marino. The chief edifices of the town are its fine churches, one of which has the tomb and statue of St. Marinus, the patron saint of the republic. The inhabitants are almost entirely engaged in the small industries of a rural community, market gardening, poultry raising, etc. The wealthy class resides in a suburb called the Borgo, which is a somewhat fashionable resort of the highest type. The government is administered by an assembly of 60 members elected for life, and from their number a council of 12 is chosen annually. Two presidents are chosen every six months. The army consists of 950 men. The population of the republic is about 10,500.

San'skrit Language. See Language, subhead *Sanskrit Language.*

San'ta An'a, Cal., a city and the county seat of Orange Co., 30 m. s.e. of Los Angeles, on the Atchison, Topeka & Santa Fe, the Southern Pacific and other railroads. A local railway connects it with Newport Beach, a seaside resort 10 m. distant. It is situated in the

fertile Santa Ana Valley, of which it is the commercial center. Oranges and other fruit, wheat, nuts, vegetables, especially celery and sugar beets, are extensively cultivated. There are large peat beds in the vicinity, and in the city are flour mills, lumber mills, soda works and a fruit- and vegetable-canning establishment. The Orange County Teachers' Library, a public library, a fine courthouse and Orange County Business College are distinguishing features of the city. Settled in 1870, Santa Ana was incorporated in 1888. Population in 1920, U. S. census, 15,485.

Santa Anna, *Sahn' tah Ah' nah,* or **Santa Ana, Antonio López de** (about 1795-1876), a Mexican general and politician, born in Jalapa, Mexico. He entered the army at the age of 15 and served against Spain. In 1828 he aided in overthrowing the existing government, and, after having led numerous insurrections, caused himself to be elected president in 1833. In two years he had practically become dictator. When Texas seceded in 1835, Santa Anna took the field, gaining a victory at the Alamo but being defeated at San Jacinto. He was made a prisoner by Houston and deposed. A little later, in the defense of Vera Cruz against the French, he lost a leg. In October, 1841, he again became a virtual dictator, ruling three years and being made prisoner Jan. 15, 1845, during a revolution, when he was banished for ten years. Retiring to Cuba, he there negotiated to betray his country to the United States. Recalled in 1846, he was made generalissimo of the army and again became president, and in the war with the United States he commanded the Mexican troops (See MEXICAN WAR).

Because of his successive failures, and especially because he was driven from Mexico City with nearly 2000 men, he was deposed in 1848, and fled to Jamaica. However, he was again recalled in 1853 and, after a short but despotic rule as president, was once again banished, sailing for Cuba on Aug. 16, 1855. Subsequently he went to Venezuela and to St. Thomas and, later still, having returned to Mexico during the French military occupation, was made grand-marshal by Maximilian. In 1867 he raised another disturbance in Mexico, was captured at Vera Cruz and condemned to be shot; but being pardoned on condition of his leaving Mexico forever, he came to the United States. He died in seclusion in Mexico City.

San'ta Bar'bara, Cal., a city and the county seat of Santa Barbara Co., 110 m. n.w. of Los Angeles, on Santa Barbara Channel and on the main coast line of the Southern Pacific Railroad. Steamers of the Pacific Coast Steamship Company give water communication with the north and south. The city is beautifully situated on a plain sloping from sea level to 340 ft. above the bay, and is one of the most popular pleasure and health resorts in California. The climate is delightful and vegetation luxuriant and varied. In the vicinity are large groves of orange, lemon, English walnut and olive. There are several large lemon-packing establishments in and near the city, and the raising of vegetables and small fruits is annually becoming more profitable. Among the valuable oil fields of Santa Barbara County are the Santa Maria field and the Purissima field near Lompoc. The eastern portion of this county is mountainous, and 1,000,000 acres have been formed into the Santa Barbara Forest Reserve.

Among the attractive features of the city are the famous Los Baños del Mar, a noted bathing establishment; the Plaza Alameda, a beautiful park of 10 acres; the De la Guerra Mansion, described in Dana's *Two Years Before the Mast;* museum of natural history; and a Carnegie library. A Franciscan mission was established here in 1786, and the well-preserved mission building is visited annually by many visitors and tourists. The mission is now the Pacific coast Franciscan headquarters, and near it is located a Franciscan college. The prominent hotels include the Potter, the Arlington, New Morris and San Marcos. A Spanish military post, or pre-

sidio, was established on the site of Santa Barbara in 1782. The place was incorporated as a city in 1850. Its present charter dates from 1900. Population in 1920, 19,441.

Santa Catalina, *Kat" a le' na.* See CATALINA ISLAND.

Santa Claus, *Klauz.* See NICHOLAS, SAINT.

Santa Cruz, *Kroos,* **Cal.,** the county seat of Santa Cruz Co., 78 m. s. of San Francisco, on the Bay of Monterey. It is reached by two lines of the Southern Pacific Railroad, and steamship lines connect it with San Francisco and points south. It has one of the largest cement-manufacturing plants on the coast. Lumber, leather, bituminous limestone, gunpowder and soap are the leading factory products. Apples, pears, peaches, prunes, apricots, grapes and strawberries are largely grown in the vicinity. Favored with an ideal winter and summer climate and an unsurpassed bathing beach with casino and natatorium, the city is one of the most popular resorts on the Pacific coast. Among the attractions are the celebrated Santa Cruz big redwood trees, Laveaga Park, and the cliffs with their prehistoric carvings and picturesque driveways. Educational facilities are represented by grammar and high schools, a business college and Catholic schools. Prominent buildings include the courthouse, Hall of Records, city hall and a public library. Santa Cruz was built on the site of a Spanish mission, established in 1791. It was first chartered in 1876, and is now administered under the commission form of government. Population in 1920, 10,917.

Santa Fe, *Fay,* the capital of New Mexico and county seat of Santa Fe Co., situated on the Atchison, Topeka & Santa Fe and Denver & Rio Grande railroads, 21 m. e. of the Rio Grande River, 73 m. n.e. of Albuquerque and 330 m. n. of El Paso, Texas. The city is beautifully situated on a plateau 7000 ft. in height and surrounded by mountains. The old part of the town is characterized by narrow, crooked streets and low adobe buildings, but the new part has wide streets, modern business blocks and beautiful residences. Fronting the Plaza, or public square, on the north, is the governor's mansion, a one-story adobe structure surrounding a court. It was built early in the 17th century and was the residence of all the governors of the territory. Here Gen. Lew Wallace wrote the last chapters of *Ben Hur.* In connection with this building is a historical museum containing a valuable collection of Indian and Spanish relics.

The important public buildings include the capitol, the Church of San Miguel, Rosario Chapel and the Cathedral of San Francisco. The educational institutions include St. Michael's College, Allison Mission, Loretto Academy, an industrial school for the deaf and the government and St. Catherine's Indian schools. In the Plaza is a soldiers' monument, and north of the city is Ft. Marcy, erected by General Kearny in 1846. There are kaolin and coal mines in the vicinity. Wholesale and retail trade with the surrounding country constitute the chief industry.

Next to St. Augustine, Santa Fe is the oldest town in the United States. The first settlement was made by Spaniards from Mexico about 1605. In 1680 the Indians revolted and the settlement was abandoned. It was regained, however, in 1692. It was captured by United States troops in 1846 during the Mexican War, was made capital of the territory in 1851 and chartered as a city in 1890. Population in 1920, 7236.

Santa Ro'sa, Cal., a city and the county seat of Sonoma Co., about 60 m. n.w. of San Francisco, on Santa Rosa Creek and on the Southern Pacific, the California Northwestern and other railroads. It lies in a region famous for its fruits and vegetables. Large quantities of grain, tobacco, hops, sugar and coffee are produced. In addition to farming, stock raising and dairying are among the leading pursuits. There are in and near the city large canning and fruit-drying establishments, flour mills, carriage works, machine shops and soap factories. An interesting feature of the

city is the Baptist Church, built entirely from the lumber supplied by a single redwood tree. Other noteworthy buildings are the city buildings, the county jail and courthouse and those housing educational institutions. Among these last are the Ursuline Academy, the Pacific Methodist College and the Santa Rosa Ladies' College. Luther Burbank, the noted American horticulturist, conducts his experiments at this place. Population in 1920, U. S. census, 8758.

Santiago, *Sahn" te ah' go,* the capital of Chile, situated on the Mapocho River, 42 m. s.e. of Valparaiso. It is about 1860 ft. above sea level, with snow-clad peaks of the Andes to the east. The board and straight streets are paved with asphalt and lighted by electricity. The important public buildings include the University of Chile, the national conservatory of music, the capitol, the executive residence, the municipal palace, an astronomical observatory and the exposition palace. The city also has a mining school, a military school, a school of agriculture and a normal institute. There are no manufactures of note. Santiago was founded in 1541 by Pedro de Valdivia. It has been the scene of several revolutionary outbreaks. The earthquake of Aug. 16, 1906, destroyed property valued at over $10,000,000, and caused the death of hundreds of the inhabitants. Population, 425,000.

Santiago, Battle of, a naval engagement of the Spanish-American War, fought off Santiago de Cuba, July 3, 1898, between an American squadron, under Commodore Schley, Admiral Sampson being absent on his flagship, and a Spanish fleet under Admiral Cervera. Seeing that Santiago was going to fall, Cervera determined to escape from the harbor, where he had been confined for several weeks. As the Spanish fleet dashed from the harbor, it was fired upon and in a few hours was completely destroyed, every vessel being sunk or captured. The Americans lost one killed and ten wounded; the Spaniards, almost 600 killed or wounded and 1700 prisoners, including Cervera.

Santo Domin'go, Republic of, a republic occupying the eastern portion of the Island of Haiti. The physical features are discussed under the title HAITI. The republic has an area of 18,000 sq. m., about the same as that of New Hampshire and Vermont. Its government is vested in a president, a Congress and a cabinet of seven members. There is no vice-president, and the president's term of office is for six years. The population is largely European and African, with some Turks, Syrians and Spaniards.

Santo Domingo has the honor of having the first permanent settlement of the New World, for upon an upland plain near a broad bay on the north coast Columbus established the little town of Isabella. Its great advantage lay in its nearness to the gold fields sought by the Spanish nobles. Later Santo Domingo, the present capital, on the south coast, became the scene of colonial splendor, and Don Diego Columbus, the son of the great explorer, established here a court whose magnificence rivaled that of Castile. In the meantime the Spanish nobles found that agriculture brought in more wealth than the search for gold did, but themselves refusing to work, they forced into their service the natives of the island, and by their cruelty soon annihilated the race. To supply their needs the slave trade from Africa was begun. The country, uncertain in government, pressed by the French at the west and envied by other nations, led an unsettled existence, part of the time under Spanish domination, part of the time united with Haiti and often in a state of revolution. In 1844 Santo Domingo separated finally from Haiti and established the Republic of Santo Domingo, or the Dominican Republic. The government at one time asked for annexation to the United States, but the negotiated treaty arranged only that the United States assist in straightening out the finances of the unfortunate country. Its population is estimated at 708,000.

Santos-Dumont, *Sahn" tos'-Deu" maun',* **Alberto** (1873-), a French

aeronaut, born in São Paulo, Brazil, and educated in France. He went to live in Paris upon the death of his father, who was a wealthy coffee planter. He has devoted himself to perfecting a navigable balloon, making his first ascent, after various experiments, in July, 1898, and after further experimenting, finally making a balloon in which, in October, 1899, he encircled Eiffel Tower several times, thus marking a new epoch in air navigation. In 1901 he sailed from St. Cloud around Eiffel Tower and back in less than 30 minutes, thereby winning the Deutsch prize of 100,000 francs. Three years later he was admitted to the Legion of Honor. *My Airships: A Story of My Life* was published by Santos-Dumont in 1904. See AERONAUTICS, subhead *Dirigible Balloon.*

São Francisco, *Soun Frahn seesh' koo,* a river of Brazil. It rises in the Serra da Canastra, in the Province of Minas Geraes, flows north and east, and empties into the Atlantic Ocean by two mouths. It receives the waters of a great number of streams, but the majestic river, with a length of about 1600 m., is greatly impeded by sand bars, rapids and cataracts, and navigation is impossible.

Saône, *Sone,* a river of France. It rises in the southern part of the Department of Vosges, flows southwestward and enters the Rhône opposite Lyons. It is navigable for 225 m. and is 300 m. in length.

Sapphire, *Saf' ire,* a precious stone of beautiful blue color. It is a variety of corundum and is of nearly the same composition as the ruby. The sapphire crystallizes in the form of double pyramids with six faces. Those of the first quality have about the same value as the diamond. Sapphires are found in Siam, Ceylon, Kasmir and Australia; and near Great Falls, Mont., where one of the richest mines in the world is located.

Sappho, *Saf' o,* (the "Tenth Muse"), a Greek poetess, supposedly born at Mitylene, on the Island of Lesbos, in the seventh century B. C. It is thought that she was the center of a band of young women to whom she taught the art of poetry and song. Of her literary works, which included odes, hymns and elegies, only fragments are extant. These, however, have the stamp of genius.

Sap'sucker", a bird of the Woodpecker Family, a trifle smaller than the robin. The male is black, spotted with white and yellow above; the top of the head, the chin and the throat are bright red; the breast is black; the under parts are pale yellowish; a pale yellowish-white line passes upward along the side of the head to the bill; the wings and tail are black, spotted with white. The female has the head and throat white. The nest is made in a dead limb, from 15 to 60 ft. from the ground, and contains four to seven white eggs. The sapsucker is so named from its fondness for drilling squarish holes in birch, maple, fruit and other trees, first, for the sap which quickly flows, and, secondly, for the insects which are attracted by the sap. Fully one-third of the insects thus caught are ants. The sapsucker breeds in eastern North America and winters in Mexico and the West Indies.

Saracens, *Sar' a senz,* the name originally applied to a tribe inhabiting a portion of northern Africa, but later extended to include the Mohammedans who lived in Syria and Palestine. The Saracens conquered Spain and Sicily and attempted to extend their conquest into France, but they were repulsed at Tours by Charles Martel, in 732. Their power began to decline about the middle of the eighth century.

Sa'rah, the wife of Abraham and mother of Isaac. She was the first to be laid in the cave of Machpelah, the historic burial place of the family and descendants of Abraham. See ABRAHAM.

Sar"ato'ga, Battles of, two important engagements of the Revolutionary War, called, also, the battles of Freeman's Farm, of Bemis Heights and of Stillwater. Burgoyne commanded 10,000 British, and the American army of 15,000 was under Horatio Gates, Benedict Arnold and Philip Schuyler. The first fight took place on Sept. 19, 1777,

when Burgoyne advanced against the Americans at Bemis Heights only to be stopped at Freeman's Farm by Arnold's advance under Morgan. The encounter was indecisive, and the contest was not renewed till Oct. 7, when Burgoyne, with 1500 picked men, opened the attack. He was counter-attacked on each flank and, after a severe fight against overwhelming numbers, was completely routed. The Americans pursued the enemy, practically surrounded them and forced Burgoyne to surrender his entire force of 6000 men to Gates, Oct. 17. Clinton had sent a small British reinforcement, but it arrived too late to be of any assistance. In both encounters Arnold was the guiding spirit. He was severely wounded, however, in the second battle.

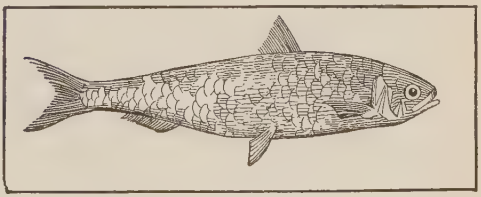
The victory of Saratoga greatly helped the American cause in Europe, and it was one of the factors which directly brought about the alliance with France. Moreover, it was the turning point of the war: it assured American independence, and for that reason it is regarded as one of the 15 decisive battles of the world.

Saratoga Springs, N. Y., a city of Saratoga Co., 39 m. n. of Albany and 185 m. n. of New York City, on the Delaware & Hudson, the Boston & Maine and the Saratoga & Mt. McGregor railroads. The name Saratoga, derived from an Indian word, means the "hillside of the great river." The city is one of the leading summer resorts in the United States, with over 50 mineral springs having a world-wide reputation for their medicinal properties. Since 1826 the waters have been bottled and sent to various parts of the world. There are but few manufacturing establishments and the region round about is composed largely of productive farms. The Temple Grove Seminary is located here, and the charitable institutions are the Saratoga and St. Faith hospitals, St. Christina Home and a Children's Home. The Saratoga Racing Park is located a mile from the city and Saratoga Lake is four miles distant. One of the state armories is also located here. There is a large plant for the making of silk gloves and there are manufactories of carbonic acid and druggists' and doctors' supplies. Twelve miles southeast of Saratoga is the battleground of Stillwater where were fought the two famous Battles of Saratoga, between the forces of Burgoyne and Gates, in 1777. Saratoga was settled about 1792 and incorporated in 1826. Population in 1920, 13,181.

Sarcophagus, *Sar kof' a gus,* a coffin of stone. Sarcophagi were used by the Egyptians, Romans, Greeks, Phœnicians and Persians. They were made of limestone, granite or alabaster, and many of them were highly decorated. They were rectangular in shape, some of them, however, conforming to the shape of the human body. They have been used among royalty and men of wealth of modern times.

Sard, a translucent variety of chalcedony of deep red color and resembling somewhat the carnelian. It was highly prized by the ancients as a gem and they attributed to it various virtues.

Sar"danapa'lus, the name given by the Greeks to the Assyrian monarch Asurbanipal. He was the last Assyrian ruler, and reigned from 668 to 624 B. C. He completed the conquest of Egypt, begun by his father, Esarhaddon, but was unable to hold the country permanently, and Egypt was lost to Assyria about 663 B. C. He was famous as a builder, and in his palace at Nineveh he gathered a great library.



SARDINE OR PILCHARD

Sardine, *Sar deen',* a small fish of the Herring Family, once found chiefly in the Mediterranean and on the coast of Brittany but now also fished in California waters. Sardines are well known through their universal use in the pickled form.

To prepare them for the market, they are cleaned and dried, boiled in olive oil, tightly packed in tin boxes and covered with oil. The covers are then soldered on and they are again boiled or steamed. California sardines, which are larger than the Mediterranean species, are most prized in the United States. Other herring, especially the pilchard, are frequently used in canning. See HERRING.

Sardin'ia, an island in the Mediterranean Sea, a part of the Kingdom of Italy. It lies off the southwestern coast of Italy, about 115 m. distant, from which it is separated by the Strait of Bonifacio. The area of this and other small islands along the coast is 9294 sq. m. Sardinia is 168 m. long and 89 m. wide. The surface is mountainous and there are numerous forests; vegetation is abundant and the climate mild, but extremely warm in summer. Along its shores are the gulfs of Asinara, Oristano and Cagliari. Gennargentu, the highest summit, has an altitude of over 6000 ft. On the fertile plains between the mountains are found agricultural products, such as wheat, oranges, olives, lemons, tobacco and grapes. Vines are extensively cultivated and there is an annual output of about 5,000,000 gallons of wine. The fisheries, especially that of the tunny, have waned in importance; mining is rapidly growing and includes the minerals silver, zinc, copper, lead, magnesium, granite and salt. The island is divided into the two provinces of Sassari and Cagliari. It was first occupied by the Carthaginians, and later came into the hands of the Romans. In 1714 it became a possession of Austria and in 1720 was ceded to Savoy. It became a part of United Italy in 1861.

Sardinia, Kingdom of, a former kingdom in Italy, forming the nucleus of the present Kingdom of Italy. It comprised the duchies of Montferrat, Savoy, Aosta, Genoa, Milan (in part), the County of Nice, the islands of Sardinia and Caprera and the Principality of Piedmont. The modern kingdom was the result of a treaty, concluded Aug. 24, 1720, between Austria and the Duke of Savoy, whereby the latter surrendered Sicily in return for receiving the Island of Sardinia and the right to form his states into a kingdom. The mainland contained the principal territory, and the center of activity was in Piedmont, and, more specifically, in Turin, the capital. After various changes in the government, King Charles Albert in 1848 granted his people a liberal constitution, and declared war against Austria. Being defeated at Novara, in 1849, he resigned in favor of his son, Victor Emmanuel II, under whom Sardinia was merged with the Kingdom of Italy. See ITALY, subhead *History.*

Sardonyx, *Sahr' do nix,* a variety of onyx consisting of alternate layers of sard, or carnelian, and white chalcedony, used as a glue. The stone was highly esteemed by the ancients for seals, cameos and intaglios. The name is sometimes applied to certain yellow varieties of chalcedony and to carnelians in which alternate bands of red and white occur.

Sardou, *Sahr" doo',* **Victorien** (1831-1908), a French dramatist, born in Paris. Failing in his early literary ventures, he became a hack writer and tutor. His tool was ridicule, and he succeeded brilliantly with dialogue, dealing with both social and political subjects. He wrote *Bernard Palissy, Le Bossu, Candide, Monsieur Garat, Les Prés Saint-Gervais, Fédora, Peril, Théodora, Séraphine, The King Carotte, Let us Get a Divorce, Patrie, La Haîne* and *La Tosca.*

Sargas'so Sea, a vast tract of the North Atlantic Ocean covered with floating seaweed. It lies between 25° and 30° north and 38° and 60° west in the central whirl caused by the ocean currents. It covers an area nearly equal to the European Continent, but its extent is subject to considerable variation. It is not definitely known whether the weed is torn from the shores by action of the waves and carried into the quiet pool between the currents, or whether it lives and propagates itself in midocean. The weed is often so dense as seriously to impede navigation, though a former argument sustaining the belief in a possi-

bility of ships becoming embedded and being unable to extricate themselves was refuted by the findings of the Norwegian expedition of 1910 under the direction of Sir John Murray, which showed the surface to be marked by patches of weeds and not covered continuously. The Sargasso Sea was discovered by Columbus, who was entangled for a fortnight in its meshes. There are similar floating masses in the Pacific and Antarctic oceans, though these are much smaller.

Sargent, *Sar' jent,* **Epes,** (1813-1880), an American author, born in Gloucester, Mass., and educated at Harvard. He was successively associated with the Boston *Advertiser* and the *Atlas,* with the New York *Mirror* and with the Boston *Evening Transcript,* of which he became editor in 1846. Later he gave all his time to literary pursuits, and his publications include *The Life and Services of Henry Clay, American Adventure by Land and Sea, Arctic Adventures by Sea and Land* and *Original Dialogues.* Besides writing the well-known lyric, *A Life on the Ocean Wave,* he edited the *Select Works of Benjamin Franklin.*

Sargent, John Singer (1856-), an American artist, born at Florence, Italy. He was a pupil of the Florence Academy and in Paris of Carolus Duran, whom he assisted in decorating the Luxembourg, and applied himself assiduously to the study of the masterpieces of European galleries and an examination of nature. Until 1884, when he removed to London, he lived in Paris. He has been honored by learned bodies and received the Grand Prize at the Paris Exposition of 1889 and 1900. His work is characterized by sureness of vision, truthfulness to nature and manual facility. Although known chiefly as a portrait painter, Sargent has been equally successful as a painter of figures; for example, *Carmencita,* in the Luxembourg. Also in a frieze called *The Prophets* in the Boston Public Library may be seen excellent examples of his work in mural decoration. His portraits include those of Henry Marquand (Metropolitan Museum); of Edwin Booth, of Lawrence Barrett and of Joseph Jefferson, for the Players' Club, New York; of President Roosevelt and of Secretary Hay; and the group called *Carnation Lily, Lily Rose* (South Kensington Museum). The degree of LL. D. was conferred upon Mr. Sargent by Cambridge University in 1913.

Sar'gon II, a King of Assyria, reigning from 722 to 705 B. C. He was the successor of Shalmaneser IV. Sargon is remembered especially for the capture of Samaria in 722 B. C., and for the subjugation of Babylon in 709 B. C. He was succeeded by his son Sennacherib. See ASSYRIA, subhead *History.*

Sar'nia, a city of Canada in the Province of Ontario, on St. Clair River near Lake Huron and across the river from Port Huron (Mich.), with which it is connected by ferry and by a railway tunnel beneath the river. It is on the Grand Trunk, the Pere Marquette and other railways and lies 61 m. w. of London. Steamer service connects it with points on Lake Huron, Lake Superior and Georgian Bay. The city is situated in the level tract along the river and has regular streets and pleasant homes. The leading industrial establishments include lumber, planing and saw mills, gas and gasoline-engine works, a large oil refinery that refines the most of the oil for the Ontario region, salt works and manufactories of chairs, stoves, carriages, spokes and hubs. Population in 1911, 9947.

Sar"saparil'la, an extract derived from the roots of a number of plants of the Smilax Family and extensively used as a tonic. There are about 200 species, mostly found in tropical America, although over 20 are found in the United States. To prepare them for drug factories the roots are merely dug, cleaned and dried; packing consists in simply wrapping them in the leaves of the plant. Sarsaparillas differ according to the plants from which they are taken and the method of their preparation. They are placed upon the market as sirups or extracts and are popular as tonics in the spring.

Sar'to, Andrea del (1487-1531), one of the best Florentine painters of the High Renaissance. His father was a tailor (Sarto); hence the name by which he is commonly known. Forsaking the trade of goldsmith, he turned to painting. Among his first works in this medium were frescoes in the Church of Santa Annunziata and scenes from the life of John the Baptist in the cloister of the Scalzi. Andrea was the greatest colorist of the Florentine School and was also distinguished for narrative power and beauty of composition. These qualities are evident in his *Last Supper* in the Convent of San Salvi, a work worthy to be compared with Leonardo's rendering of the same subject. His *Disputa* and *Madonna of the Harpies* are equally famous and justify the encomium of "Faultless Painter," long applied to him.

Saskatchewan, *Sas kach' e won,* a province of the Dominion of Canada, bounded on the n. by Mackenzie, on the e. by Manitoba, on the s. by the United States and on the w. by Alberta. The length from north to south is 760 m., the average width 367 m. and the area 250,650 sq. m., of which 8318 sq. m. are water. Saskatchewan is more than twice the size of Great Britain and Ireland and could contain France or Germany and the State of Ohio, and is the fifth province of the Dominion in area. Population in 1911, 492,432.

Surface. The province lies wholly within the Great Central Plain of North America, and its surface is generally rolling prairie. The river valleys are channeled by a long period of wearing. Most of the surface is covered with a dark vegetable loam of great fertility.

Climate. The southern part of the province has dry, cold winters and remarkably pleasant summers, characterized by clear skies and bright sunny days. The mean temperature for February is about 5° F., that for July, 63.5° Throughout the province the climate is bracing and healthful; the average rainfall is from 15 to 17 inches. The heaviest rains occur in early summer when most needed by growing crops.

Lakes and Rivers. The lakes are most numerous in the northern half of the province. The largest is Lake Athabaska, something over one-half of which is in Saskatchewan and the remainder in Alberta. Reindeer Lake on the eastern border is next in size. Others worthy of mention are Black Lake, Cree Lake and Wollaston Lake. South of these a chain of small lakes extends nearly across the province from east to west. The Saskatchewan, with the North Saskatchewan, forms the chief river system. South of these are the Qu' Appelle and the Souris, which drain the southeastern part of the province. The Saskatchewan system drains the central and south-central portions, and the northern part is drained by the Churchill, the Geikie, the Waterfound and the Cree. The extreme northern part is drained into the Arctic through the Slave and Mackenzie river system. A few small streams near the southern border belong to the Missouri system. With these exceptions, the entire province is drained into Hudson Bay.

Minerals and Mining. So far as known the province contains about 8000 sq. m. of coal measures. Most of the coal is lignite; some 30 mines are in operation to supply local needs. The most important mines are along the Souris River. There is an abundance of clay for making brick and some suitable for pottery. Other products are salt, peat, gold, pigments and natural gas. The mineral resources of the province have received only slight attention, owing to the preponderance of the agricultural interests.

Agriculture. Nearly the entire province consists of tillable land, most of which is of a high degree of fertility. Agriculture is the chief industry, engaging the attention of from 60 to 70 per cent of the inhabitants.

Crops. Wheat, oats, barley and rye among the cereals, and flax, potatoes and garden vegetables are all raised in large quantities, but wheat is the crop that receives the greatest attention, both winter and spring varieties being grown. The

southern part of the province is adapted to both winter and spring wheat, but only the spring varieties can be grown farther north. Both regions produce wheat of the highest grade and the average yield is about 19.5 bushels to the acre, which exceeds by five bushels the average in the United States. Saskatchewan is the largest wheat-growing province in Canada and is the second wheat-producing state in North America. Oats, barley and flax are raised in large quantities, as are potatoes and vegetables. Small fruits succeed, as do some of the hardier varieties of apples in the southern part of the province.

Live Stock. The prairies are covered with rich native grasses and furnish excellent pasturage, so that stock raising is a common and a profitable branch of agriculture. Saskatchewan has many horses, cattle, sheep and hogs and is an important source of supply for neighboring and Eastern markets. Dairying is practiced to a sufficient extent to supply local demands.

Mixed Farming. Many localities are better adapted to mixed farming than to the wheat industry alone. It is in these localities that live stock and dairying receive the most attention. Potatoes and vegetables are also grown in large quantities. Throughout the province the most modern methods and machinery are employed. On many of the larger farms the traction engine has replaced the horse and mule for plowing and harvesting, and the most improved patterns of harvesters and thrashing machines are everywhere employed. The farmer's life is usually one of more than ordinary freedom. Within a few years after his arrival he has a farm free from debt and a good home supplied with all the necessities and many of the luxuries of life. His social conditions are as good as or better than those in many older states.

Statistics. In 1917 the leading products of Saskatchewan were as follows:

CROPS IN BUSHELS

Wheat	147,559,000
Oats	163,278,000
Barley	9,916,000
Flax	6,692,000

LIVE STOCK

Horses	574,972
Cattle	777,502
Sheep	125,072
Hogs	333,218

SASKATCHEWAN

MANUFACTURES. Manufactures are still in their infancy, but the rapid increase in population in the last few years has created a strong demand for factories, which will doubtless soon be met. Repairing of railway cars and locomotives and such minor local industries as are necessary to their immediate neighborhoods constituted the bulk of the manufacturing in 1911.

TRANSPORTATION AND COMMUNICATION. For a new country Saskatchewan is remarkably well supplied with railway facilities, the railway mileage in 1911 being 3121. The Canadian Pacific crosses the southern part; the Grand Trunk Pacific, the south-central part; and north of this line is the Canadian Northern. These three great trunk lines have numerous branches extending north and south and in other directions, so that practically all the settlements are within easy reach of railway communication. A line has been constructed from Saskatoon to Prince Albert, and another line extends from Prince Albert eastward to Erwood, from whence a line is projected to Ft. Churchill on Hudson Bay. Telegraph and telephone lines are found in settled portions of the province, and the telephone is found in many farm homes. The lines are under control of the government and free from monopolistic influences.

GOVERNMENT. The chief executive is the lieutenant-governor, who is appointed by the governor-general of the Dominion for a term of five years. He is assisted by an advisory council appointed by himself for the heads of departments of the provincial government. The Legislature consists of an Assembly of 54 members. The provincial government has authority to legislate upon all matters pertaining to the province, but its

acts must conform to the constitution and the laws of the Dominion Parliament. There is a system of courts whose judges are appointed by the Dominion Parliament for life. Saskatchewan has four members in the Dominion Senate and ten in the House of Commons.

EDUCATION. The province has an excellent system of public schools, which reaches to all outlying districts. The provincial university and school of agriculture are at Saskatoon, and graded and high schools are established in all cities and large towns.

CITIES. The chief cities are Regina, the capital; Saskatoon, Moosejaw and Prince Albert.

HISTORY. The name Saskatchewan is of Indian origin and means rushing water. The province was formerly a part of the Hudson's Bay Company's territory which was purchased by the Dominion Government in 1869. Settlers were early attracted by the fertility of the land. In 1882 Saskatchewan was made a district and in 1905 became a province of the Dominion of Canada.

Saskatchewan River, a river of southern and central Canada made up of two main branches, the North Saskatchewan and the South Saskatchewan. The former rises in Alberta, a little north of Edmonton, and flows south and east, while the latter, rising in southern Alberta near the foothills of the Rocky Mountains, flows north and east; the two meet not far from the center of the Province of Saskatchewan and flow by a tortuous course into Lake Winnipeg. Flowing out from Lake Winnipeg to Hudson Bay, the river is called the Nelson. River steamers ascend the north branch for 850 m., and smaller boats ply busily in the shallower waters. The growing cities of Saskatoon and Battleford lie upon the shores, and the surrounding country is rich for agricultural purposes.

Sas"katoon', a city of Canada in the Province of Saskatchewan, situated on the South Saskatchewan River and on the Canadian Pacific, Canadian Northern, Grand Trunk and other railroads, 535 m. w. of Winnipeg. It is a growing Western city with good commercial interests, to which were added educational advantages in 1910 when it was made the seat of the provincial university. The principal buildings include the courthouse, a collegiate institute, the opera house, custom-house, Dominion Land Office and Lands Titles Office. Over 120 wholesale houses are located there, about 50 of which are in the implement trade. The chief industrial plants include a sash and door factory, a brewery, a flour mill, woodworking factories, cement-block plants, tin, mattress and cigar factories, bottling works and a sawmill. Population in 1911, 12,004.

Sas'safras, a well-known tree of the Laurel Family, growing in rich woods of the North. It is not a large tree and is often shrublike in its manner of growth. The sassafras has yellowish-green leaves and branches, which have a pleasing taste and fragrance. The leaves are irregular in shape, some being three-cleft, others mitten-shaped and still others merely blunt-pointed. The leaves and flowers appear at the same time in the spring. The latter are borne in long clusters and are of two kinds: fertile, or those which finally bear fruit; and sterile, or those which bear no fruit. There are nine stamens, always arranged three in a row. Sassafras is used in medicine in the production of ointment, and elsewhere as a source of mucilage and of a paste used in confectionery.

Sat'ellite, the name by which the smaller bodies which revolve about planets are known. There are at least 22 satellites in the solar system, distributed as follows: Earth, one; Mars, two; Jupiter, eight, Saturn, ten; Neptune, one; and Uranus, four. These satellites are described in connection with their respective planets. Also see MOON.

Sat'in, a closely-woven silk fabric with a shiny surface. The gloss is obtained by raising a smaller number of threads of the warp than in the weft instead of alternating them, as in ordinary weaving. The continuous smooth surface in this way produced reflects the light and acquires a brighter luster than

otherwise would result. The chief satin manufactories are at Genoa and Florence in Italy, and Lyons in France. A cheap fabric known as sateen is produced with the same weave from cotton, wool and linen.

Satolli, *Sah tole' lee,* **Francesco** (1839-1910), a Roman Catholic prelate, born in Perugia, Italy. He was educated in the diocesan seminary of his native city, then presided over by Gioacchino Pecci, and when Pecci became Pope Leo XIII, he summoned Satolli to the Vatican. In 1888 he was made Archbishop of Lepanto. The same year he represented Pope Leo at the celebration of the centenary of the Catholic hierarchy in the United States and at the inauguration of the Catholic University in Washington, D. C. Impressed with Satolli's advice as to the possibilities of advancing the Church in his country, the Pope appointed him apostolic delegate in the United States in 1893. He was created a cardinal in 1895 and returned to Rome the following year.

Sat'urday, the seventh day of the week, the Sabbath of the Jews and a small body of Christians. The name comes from that of the planet Saturn.

Sat'urn, the planet of the solar system sixth outward from the sun, its mean distance being 886,000,000 m. Its diameter is about 71,000 m.; its mass, about 90 times that of the earth; its day is 10 h., 14 min.; and its year is 29½ of our years. It has ten moons, and is surrounded by rings, the outer of which is perhaps 168,000 m. in diameter, and 10,000 m. broad. These rings are supposed to be gaseous matter, or possibly innumerable small satellites. In size, the planet is next smaller than Jupiter. It is probably gaseous and surrounded by a very dense atmosphere. Saturn has a reddish color, and may be easily seen by the naked eye at certain seasons of the year in the morning and evening. See SOLAR SYSTEM.

Sat"urna'lia, an ancient Roman festival celebrated on the 17th of December, after the conclusion of the winter sowing in Italy, and in honor of Saturn, the divinity supposed to preside over the sowing of seed. The public religious rites were concluded in one day. These, however, were gradually modified, many Greek ceremonies being introduced. In later times the people gave themselves up to unrestrained mirth for the succeeding four or six days; no public business could be transacted; the law courts and the schools were closed and military operations suspended. Banquets were held, gifts exchanged, and the slaves, free from restraint, sat at the table with their masters or were served by them.

Satyrs, *Sat' ers,* according to Greek myths, demigods of the country, of unknown origin. They were represented as men having the feet and legs of goats and the entire body covered with thick hair. They were associated with Bacchus, as it was supposed that they owed their deification to the festivals of this god; at these festivals they first appeared as rude rustics, dancing in their goatskin dresses. They are generally thought of as sensual.

Sau'gus, Mass., a town of Essex Co., 4 m. w. of Lynn and 10 m. n.e. of Boston, on Lynn Harbor and Saugus River and on the Boston & Maine Railroad. The town contains the villages of Cliftondale and East Saugus. It is chiefly a residential region but has manufactories of leather, flannel, rock drills, brick, spices and boots and shoes. There are also large woolen mills. Population in 1920, U. S. census, 10,874.

Saul, first King of Israel, the son of Kish, of the tribe of Benjamin, who reigned about 1050 B. C. He was anointed king by Samuel, but after assuming the royal authority he failed to consult the prophet in the direction of affairs, thus violating the conditions on which the monarchy was founded. Before he forfeited his throne, however, he won several successes over neighboring tribes, thus extending the boundaries of his kingdom. He was succeeded by David, the account of whose relations with Saul is found in the first book of *Samuel.*

Sault Ste. Marie, *Soo" Sante Ma'ry,* a city of Canada in the Province of

Ontario, and the capital of Algoma District, on the St. Mary's River and the "Soo" Canal. It is entered by the Canadian Pacific, the Algoma Central & Hudson Bay and other railways, and is connected by boat lines with all ports on the Great Lakes. A fleet of freight and passenger boats makes this city its headquarters, and a steel railway bridge spans the river at this point. The city is located in a country rich in natural resources and capable of almost unlimited development. The rapids in the St. Mary's River are picturesque, and "shooting the rapids" with Indian guides is a thrilling sport for tourists. Commercially these rapids are important, furnishing water power and electric light for the city, electric power for the great steel mills and possessing many thousands of horse power yet undeveloped. The Canadian ship canal, with its hige lock, carries lake traffic around the rapids, and the use of it is free to ships of both Canada and the United States.

The iron ore in the vicinity has made the Canadian "Soo" an important iron and steel city, and the great plants are among the city's most important establishments. Many tons of ingots, steel rails and other iron and steel products are prepared and shipped annually. The pulp mills and paper mills turning out many hundred tons of paper, for news print daily, supplied by the great spruce forests, are also extensive. Other important industrial concerns are the foundries, blast furnaces, sawmills, and plants connected with the shipping. Population in 1920, U. S. census, 12,096.

Sault Ste. Marie, Mich., a city, port of delivery and the county seat of Chippewa Co., 350 m. n.w. of Detroit on St. Mary's River, which connects lakes Superior and Huron, and on the Minneapolis & St. Paul, the Canadian Pacific, the Duluth, South Shore & Atlantic and other railroads. An international railway bridge and ferries connect it with the Canadian town of Sault Ste. Marie. The river, here about one-half mile in width, decends 19 ft. in three-fourths of a mile, but is made navigable by locks constructed by the Federal Government. During the navigation season, which lasts about eight and one-half months, more annual commerce passes through this than through any other canal in the world. In 1919 the freight traffic amounted to almost 100,000,000 tons. By means of power canals the river furnishes water power equivalent to over 100,000-horsepower, which is used in several important industries. In the town are fish-packing establishments and manufactories of lumber, flour, paper, carbide, dredging machinery, leather, and woolen goods. A government park extends along the river front past the locks. It contains beautiful walks and shade trees, a monument erected to commemorate the semicentennial of the opening of the locks, and a Japanese arch, which was presented to the city.

On the site of Sault Ste. Marie, Jacques Marquette established in 1668 the first settlement within the present limits of Michigan. Three years later the governor-general of New France called a council of Indians and here took formal possession in the name of the King of France of all the territory south to the Gulf of Mexico and west to the Pacific. Sault Ste. Marie was incorporated as a village in 1879 and in 1887 was chartered as a city. Population in 1920, U. S. Census, 12,096.

Sault Ste. Marie Canals, the most used of any ship canals in the world. They make possible unrestricted navigation between lakes Superior and Huron, around the rapids of the St. Mary's River, which here falls about 19 ft. within a very short distance. The first United States Canal, opened in 1855, cost $1,000,000. It was enlarged and its depth increased to 16 ft. between 1870 and 1881, at a cost of $2,150,000. The Poe Lock, a second lock completed in 1896 at a cost of $5,000,000, is 800 ft. long, 100 ft. wide, and has a depth of about 22 ft. of water on the sills. North of the Poe Lock and parallel to it, a third Ameri-

can lock was completed in 1916. This new lock is 1000 ft. long and 24 ft. deep. A fourth American Lock was opened to traffic in 1919. The Canadian Canal, 60 ft. wide and 900 ft. long, with a depth slightly more than 22 ft., was completed in 1895. These locks have a lift of some 18 ft., and the machinery for operating them is worked by hydraulic and electric power. During the usual eight and one-half months of navigation traffic is so great that the Locks average one boat for each 15 minutes of every 24 hours. The tonnage passing through the Soo Canal in one month is equal to the total tonnage of the Panama Canal for the first three years of its use, the tonnage passing through the American lock, being between the iron and copper districts of the Lake Superior region and the manufacturing centers on Lake Erie and Lake Michigan. Much wheat and lumber are shipped south, coal and manufactured goods north. See CANAL.

Saun'ders, Margaret Marshall (1861-), a Canadian author, born in Nova Scotia and educated in Scotland and France. Besides writing short stories for various magazines, she is the author of *My Spanish Sailor, Beautiful Joe,* which has reached a circulation of more than 500,000 and has been translated into several languages, *Tilda Jane, Nita* and *My Pets.*

Saunders, William (1836-), a Canadian public official, born in Devonshire, England. He was successively a manufacturing chemist in London, Ontario, a farmer, professor at Western University, a public analyst and president of the Ontario College of Pharmacy. Instructed by the government, he investigated agricultural experimental work in Europe and America in 1885, and, after the establishment of experimental farms in Canada, was in control from 1886 to 1911. Mr. Saunders is known throughout America for his investigations in chemistry and forestry, and he is responsible for many practical experiments in Canadian plant breeding.

Sausage, *Sau' saj,* an article of food made of finely-chopped or ground meat and highly seasoned with various substances such as salt, pepper, herbs and garlic. The Romans made sausage of fresh pork and bacon finely minced with nuts and flavored with pepper, cumin seed, bay leaves and a sauce made of fish. Bologna sausages from Italy are much esteemed. They consist of veal, salt beef, salt pork and bacon, all finely minced and seasoned with sage, mixed herbs, pepper and spices. Germany produces a large variety of sausages that are highly prized; among them are the smoked sausages, made of fat and lean pork, preserved for about a week by salt, saltpeter, black pepper and allspice, which are incorporated into them. Afterwards they are smoked. Sausages made of young pig's meat finely chopped and flavored with sage, salt and pepper are much esteemed as a breakfast dish. Pork sausages are made in various ways. The greatest portion of the sausages produced in the United States are by-products of the packing houses and made from the trimmings, cuttings and scraps of the animals; those made elsewhere are known as country sausages. Most sausage is placed on the market packed in skins from the intestine of the hog, but it is occasionally sold in bulk. See MEAT PACKING.

Sav'age, Richard (?-1743), an English poet, of greater interest because of the admirable *Life of Savage,* written by Samuel Johnson, than for any of his writings. He was a satirist of no mean powers, but suffered from poverty and unpopularity which finally led to imprisonment. His works include *The Convocation, or The Battle of Pamphlets, Love in a Veil, The Author to be Let* and *The Wanderer.*

Savan'nah, Ga., a port of entry and county seat of Chatham Co., 300 m. s.e. of Atlanta, on the Savannah River, 18 m. from the Atlantic Ocean and on the Central of Georgia, the Seaboard Air Line, the Atlantic Coast Line, the Southern, the Savannah & Statesboro, the Brinson and other railroads. Savannah Harbor has excellent seacoast defenses. and the city is connected by trans-At-

antic lines with European ports and by coastwise steamers to Baltimore, Philadelphia, New York, Boston and other cities. Savannah is located about 1613 nautical miles from the Panama Canal. In recognition of the commercial importance of the city, the Federal Government has made extensive improvements to both the river channel and the harbor. Savannah has an area of about 7.11 sq. m. and is situated on a plateau 40 ft. above the river. There is an excellent system of electric street and suburban railways. The surrounding region is chiefly agricultural, and sea-island cotton, fruits and sugar cane and vegetables for the Northern markets are extensively grown.

Parks and Boulevards. Savannah contains about 54 parks and squares, with a total area of 182 acres, and has retained and extended in her splendid system of streets and parks the original design of Oglethorpe, the founder of the city. Among the larger parks of the city are Daffin, Colonial and Forsyth parks. The city is known as the "Forest City" on account of its shade trees and tropical foliage. Estill Avenue, 100 ft. wide, has down its center parkway a double avenue of palms. Among the many handsome residential streets are Gaston, Bull, Whitaker, Barnard and Abercorn, which have fountains, lawns, flowers and sunken gardens. Bay, Broughton and West Broad streets are the principal commercial streets of the city. In Johnson Square stands a monument erected in 1829 in memory of Gen. Nathanael Greene, to whom Congress gave a tract of land near the city in recognition of his valiant service in the War of the Revolution. In Monterey Square a monument and statue has been erected in honor of Count Pulaski, who was mortally wounded in 1779 during the siege of Savannah. Other monuments include a Confederate Soldiers' Monument and those in memory of Sergt. William Jasper, Maj.-Gen. Lawton and Maj.-Gen. Lafayette McLaws. In honor of Tomochichi, an Indian chief who was a friend of the early settlers, a granite boulder has been placed in Wright Square.

The chain of islands from Tybee Sound to the end of Cumberland Island are noted pleasure resorts having beautiful beaches and many fine residences. These islands include Tybee, 18 m. from Savannah, Green Island, Wilmington, Isle of Hope, Vernon View on Burnside Island, White Bluff, Montgomery, Beaulieu, Ossabaw and Wassaw. The military companies of Savannah own the "Park Extension," a military plaza of about 20 acres in the heart of the city. The average seasonal temperature of Savannah is 81° in summer, and in winter, 51°.

Public Buildings. The noteworthy buildings include a city hall, county courthouse, customs-house, United States Courthouse, Masonic Hall, Lawton Memorial Building, a public library, Catholic Library Association, Cotton Exchange, Union Station, Knights of Pythias Hall, Knights of Columbus Hall, Oglethorpe Club and Harmonie Club buildings, First Regiment, Chatham Artillery, Savannah Volunteer Guards and Georgia Hussars armories, about 15 banks, the De Soto, the Savannah, the Pulaski and Hicks hotels, and 36 churches for whites and about 13 for colored. The city is the seat of a Catholic see and of an Episcopal bishopric.

Institutions. Among the educational institutions are Chatham Academy, the second oldest academy in the state; the Telfair Academy of Arts and Sciences, the Richards Business College, Benedictine College, a high school, several private schools and about 15 public schools. The Georgia State Industrial College (colored) near the city is a part of the University of Georgia. The benevolent and charitable institutions include the Savannah Female Orphan Asylum, St. Mary's Home, Episcopal Orphans' Home, Bethesda Home, Abraham's Home, Little Sisters of the Poor, the Telfair, United States Marine, St. Joseph's and Savannah hospitals, the Oglethorpe and Park View sanitariums,

Georgia Infirmary and Charity Hospital for the colored.

INDUSTRY AND COMMERCE. Savannah ranks first as a naval-stores market and third among the cotton ports of the world. The principal exports include cotton, cotton goods, cottonseed oil, turpentine, rice, sugar cane, rosin, phosphate, hardwoods and naval stores. The manufactured products include car wheels, barrels, boxes, baskets, wagons and carriages, confectionery, cigars, mattresses, ink, rosin, paints, trunks, harness and fertilizers. The city is an important distributing center for Southern trade on account of its natural advantages in location. About 5000 acres in the immediate vicinity of the city are under cultivation, forming prosperous fruit and truck farms.

HISTORY. The youngest of the 13 colonies was founded on the site of Savannah in 1733 by Gen. James Edward Oglethorpe, with about 125 colonists from England. It was named in honor of George II of England. Among the early arrivals were John and Charles Wesley, who came in 1735, but they returned to England two years later. In 1740 George Whitefield founded the Orphanage of Bethesda near Savannah. The first Legislature of Georgia, as a state, met here. A city charter was granted in 1789. In 1819 the *City of Savannah*, the first steamship to cross the Atlantic, sailed from Savannah to Liverpool in 35 days. The limits of the city were extended in 1879, 1883, 1901 and 1912. Population in 1920, 83,252.

Savannah, Capture of. During the Civil War Savannah, Ga., was taken by Sherman, Dec. 21, 1864, as the end of his famous march to the sea. After considerable difficulty Sherman and his 60,000 men reached the town, which was held by Hardee with 15,000 Confederates. Two days later, Dec. 12, Hazen took Ft. McAllister, thus establishing communications with Dahlgren's Federal fleet off Savannah. Seeing that he was about to be surrounded, Hardee evacuated the city, by means of a pontoon bridge, on the night of the 20th.

Savannah River, a river of the United States. It is formed by the junction of the Tugaloo and the Kiowee, near the southern boundary of North Carolina, flows in a southeasterly direction and enters the Atlantic Ocean through Tybee Roads. Its length is 450 m. It is navigable for large steamers to Savannah and for river boats to Augusta about 230 m. The Savannah forms the boundary between South Carolina and Georgia for nearly its entire length.

Savings Banks. See BANKS AND BANKING.

Sav"onaro'la, Girolamo (1452-1498), a famous Italian preacher, reformer and martyr, born at Ferrara. He was a precocious and serious-minded youth, of strong religious feeling. After receiving a good education, at the age of 22 he entered the Convent of Dominican Friars at Bologna, where he gave himself to his studies with great success, and at the same time imposed upon himself the severest discipline and self-denial. He was admitted to holy orders and went to Ferrara to preach in 1482, soon going from there to Florence, where Lorenzo the Magnificent was at the height of his popularity. His first real success as a preacher was gained at St. Gemignano in 1484-85, but his power as an orator was not fully revealed until the following year at Brescia. Here his impassioned presentation of the wrath and mercy of God, based on the *Book of Revelation,* at once alarmed and charmed his hearers. He returned to Florence in 1490, where his fame as an orator and unsparing preacher of righteousness at once gave him a wide hearing and tremendous influence.

The following year he was made prior of San Marco, and in impassioned eloquence predicted the judgment of God upon the city unless it abandoned its luxurious and evil ways. He especially denounced Lorenzo and the government, and did not spare even the worldly pontiff, Alexander VI. In 1492 Lorenzo died, and two years later Charles VIII of France invaded Italy at the head of a large army. The patriotic service

which Savonarola rendered at this time gave him great influence in Florence; and when the Medici were driven from the city he called a mass meeting of the people, and a government was formed which made him virtual director. The aim of the party of Savonarola was the establishment of an ideal Christian commonwealth in which the people should fear God and devote themselves to righteousness. Under his preaching of denunciation, Florence was so moved with religious enthusiasm that it became a new city.

But the pleasure-loving people soon wearied of the puritanical life prescribed for them. Reaction set in and Savonarola lost his influence. The other cities of Italy were hostile. There was famine and pestilence which Savonarola was not able to alleviate. The Pope joined in the opposition and excommunicated him when he refused to obey the summons to Rome. Things came to a head in 1498, and Savonarola was arrested on the charge of heresy and sedition. After an unfair trial, accompanied by long and cruel torture, he was condemned to death, and was executed by hanging on May 23, 1498. Savonarola was eloquent and fearless, an uncompromising denouncer of sin among both high and low, one of the great reformers before the Reformation. He had unusual talent for political organization, and his patriotism was unbounded. But the age in which he lived was not ready for his lofty idealism in religion and in government, and he became a martyr to the cause of reform. His voluminous writings include sermons, essays, poems and a treatise on the Government of Florence.

Savoy', House of, an ancient royal family of Italy, from which the present ruler is descended. The house was founded by Humbert (about 1003-56), who received from Rudolph III, King of Arles, the land which formed the nucleus of the State of Savoy, and with these, the title of Count (1027). His successors greatly extended his dominions. Amadeus VII (1383-91) gave Savoy an outlet to the sea by obtaining possession of Nice, and in 1416 Amadeus VIII secured the erection of Savoy into a duchy. In 1535 Francis I of France seized the dominions of the House of Savoy, but they were restored in 1559 to Emmanuel Philibert. His son, Charles Emmanuel I (1580-1630), engaged in wars with France and lost portions of his territory. The next ruler, Victor Amadeus I (1630-37), received part of Montferrat, but was forced to surrender the fortress of Pinerole to France. Victor Amadeus II (1675-1732) at first aided France in the War of the Spanish Succession, later becoming an ally of Austria. By the Treaty of Utrecht in 1713 he was given possession of Sicily and the remainder of Montferrat. In 1720 Sicily was exchanged for Sardinia, which had been given to Austria, and Victor Amadeus II assumed the title of King of Sardina. See SARDINA, KINGDOM OF.

Saw, a tool having a tempered-steel blade with a series of angular, pointed teeth, employed chiefly to cut wood, but also used for cutting stone, metal and other substances. The many different forms, shapes and sizes of saws used in the arts and industries are dependent upon the uses for which they are intended. Saws are known as handsaws, machine saws, crosscut saws and ripsaws. A carpenter uses a handsaw, a ripsaw and a panel saw, all being of the same form but of different sizes. The largest teeth are in the ripsaw, which is used for splitting or cutting lengthwise through the plank. A saw which is used to saw stove wood placed on a buck is known as a bucksaw. The name buzz saw was originally given to the small, circular saw used by jewelers to cut metal, and the name crosscut saw formerly designated a special saw operated by two persons for cutting large logs. Blades of steel operating to and fro by power, accompanied by sand and water, are used for cutting limestone, marble and other soft stones.

Saws employed in sawmills are of three forms: the sash saw, called a gang

saw when more than one blade is used, and which operates up and down; the circular saw with teeth around its curved edge; and the band saw, which is an endless ribbon of thin steel having teeth on one edge and running over pulleys like a belt. Machinists use a small hand instrument called a hack saw for cutting metals. Large circular saws having removable teeth for cutting lumber, planks, etc., are known as inserted-tooth saws, while those having black diamonds fastened to their edges for cutting marble are known as diamond saws. Steel is now easily cut by circular saws made of special, high-tempered steel. The finest saws are those employed by surgeons. Saws for cutting ice are made with very large teeth, while butchers' saws have small ones.

Saw'fish", a family of long fishes found near the mouths of tropical rivers in America, Africa and the West Indies. Their name applies to the horny prolongation of the snout into a flat blade set with strong teeth which extend from it at right angles. This saw forms an effective weapon and by means of it the fish can easily overcome such fish as the mullet, sardines and herring, which form its prey. The sawfish becomes from 10 to 20 ft. in length and has a long, narrow body, with broad flippers in place of the ordinary pectoral fins upon the side of the body. The mouth is located beneath the saw, and has many large, crushing teeth.

Saw'fly", a family of the simplest insects belonging to the order Hymenoptera. Members of the family are among the pestiferous insects, for they attack the rose, willow, currant, pear and larch. By means of a tiny saw attached to the last segment of the body the female makes a slit in the bark and deposits the eggs within. These hatch into soft-bodied caterpillarlike larvæ, which feed upon the tender tissues of the leaves; because they are aided in crawling by exuding a slimy secretion, sawfly larvæ are called slugs. When mature, the larvæ drop to the ground and burrow, passing the pupa stage in soft silk-lined nests. The adult sawflies have broad, flattened bodies, and may be seen hovering about trees and shrubs.

The slugs do great damage to fruits. They eat the entire leaf and leave no protecting shade over the ripening fruit. The rose and willow slugs are probably commonest and sometimes produce galls. All may be destroyed by sprinkling the leaves with white hellebore (one ounce in two gallons of water) or Paris green (one teaspoonful in two gallons of water). Neither of these should be used, however, when the fruit is nearly ripe. See HYMENOPTERA.

Saw'mill". See LUMBER, subhead *Sawing*.

Saxe, *Sax,* John Godfrey (1816-1887), an American poet, born at Highgate, Vt. After graduating from Middlebury College he was called to the bar in 1843, and from 1850 to 1856 he edited the Burlington *Sentinel*. He became attorney-general of Vermont and deputy collector of customs, and was the candidate of the Democratic Party for governor of Vermont in 1859 and in 1860. After 1872 he edited the Albany *Evening Journal* at Albany, N. Y., where he lived until his death. His work is humorous, abounding in puns and burlesque; there is also genuine human interest and feeling in his verse. He wrote *Poems, The Money-King and Other Poems, Clever Stories of Many Nations Rendered in Rhyme, The Masquerade, and Other Poems, Fables and Legends of Many Countries* and *Leisure-Day Rhymes.*

Saxe, Maurice, COUNT DE (1696-1750), a marshal of France, natural son of Augustus II of Poland. When 12 he joined Marlborough's army in Flanders, and in 1711 joined the Russo-Polish army, but becoming unpopular with the Government of Russia, he went to Paris in 1720. There he studied military tactics, originating and developing a commendable system of maneuvers. When his father died he refused the command of the Saxon army, which Augustus III, his brother, tendered him, but joining the army on the Rhine, distinguished himself with the French at the siege of

Philippsburg and decided Ettingen by a brilliant charge. In the War of the Austrian Succession he gained the complete victory of Fontenoy, May, 1745, and following his celebrated work at Raucoux, October, 1746, he was made marshal-general, an honor only once before accorded. His subsequent victories at Laffeld and Maestricht were soon followed by the Peace of Aix-la-Chapelle. Saxe was probably the foremost captain of his day, and of him Frederick of Prussia said, "He could teach all the generals in Europe." In 1757 *Mes Rèveries,* Saxe's work on the art of war, was published in Paris.

Saxifrage, *Sak' si fraje,* or **Rock Breaker,** a little spring plant of the Saxifrage Family, which loves rocky slopes and barren hillsides. Early in the season it puts forth a circle of blunt leaves which lie flat on the rocks, and later from the center of these a number of branching flower stalks arise. The flowers have five pointed sepals and five spreading, white or purple petals. The beauty of these little blossoms is enhanced by the purple shade of the stamens, of which there are from five to ten. Swamp saxifrage is a larger, less pleasing plant growing in marshes as far west as Kansas. The leaves and stems are stout and hairy and the flowers have a greenish tinge. The roots of saxifrage were once supposed to have medicinal value.

Sax'ons, an ancient Teutonic race living along the banks of the Elbe and the islands at its mouth. Ptolemy states that they lived near the Jutes and Angles. Later they had enlarged their territory from the Rhine delta to the Weser. Many migrated to Britain in the fifth and sixth centuries and settled in the south of England. Those who remained, since then called the "Old Saxons," extended their conquests southward. A part of their ancient kingdom still bears the name of Saxony. Charlemagne conquered them and established fiefs and bishoprics among them. Their great leader, Widukind, claimed descent from Woden.

Sax'ony, one of the four principal states of Germany, is situated in the southern part of the republic and is almost surrounded by Prussia, although Bohemia bounds it upon the south and Bavaria and the Thuringian States

SAXIFRAGE

touch it upon the west. It has an area of 5787 square miles. The River Elbe drains the country and in the northern part has cut picturesque gorges in the soft sandstone rocks. Elsewhere the country is slightly mountainous, although none of the peaks are high. Saxony contains the most fertile lands of Germany, and agriculture is

in an advanced state; rye, oats, wheat and barley are raised in abundance. The great fruit orchards are due to the forethought of the Elector Augustus I, who is said to have always carried seeds for distribution among the peasants. Vineyards and flax fields are also common. The various branches of agriculture—horse breeding, stock and poultry raising, as well as beekeeping and fish culture—are all carried on. The forests are extensive and Saxony has maintained a school of forestry at Tharandt since 1811. Of the forests, 35 per cent belong to the State. Aside from agriculture, the textile industries lead in importance; among the other industries are the manufacture of earthenware, chemicals, paper and machinery. Silver, tin, iron, cobalt and coal constitute the mineral wealth.

Saxony claims to be the most highly educated country of Europe, and schools and means of culture have always received careful attention; at the head of the educational system stands the famous University of Leipsic. Dresden is famous for its art collection, while Chemnitz, the third important city, is a commercial center. Like all states of the German Republic Saxony enjoys a republican form of government. Saxony always held a prominent place among the German States. In the 10th century it was the most powerful state and furnished the emperors of Rome. In the reign of Otto I, Denmark, Poland, and Bohemia were vassal states of Saxony. Population, 4,802,485.

Scab'bard Fish, a family of fish found in warm, open seas. The long, slender bodies of these fish are supposed to bear some resemblance to a sheathed sword, and the metallic luster of the scales adds to this effect. The scabbard fish may be known by its continuous, ribbonlike dorsal fin and its long jaws set with small, sharp teeth. Its length is about five or six feet. The scabbard fish is sometimes called the frost fish.

Scad. See TUNA.

Scald, *Skahld,* an ancient Scandinavian poet and reciter of heroic poems. The name is derived from the word *scaldre,* to polish; in other words, the scald was a smoother of language. From the eighth century to the end of the twelfth, these poets traveled from court to court, singing their songs for the entertainment of kings, princes and nobles. The chief characteristic of the versification of scaldic poetry was alliteration. This art came to an end with the introduction of Christianity, though it experienced a revival somewhat later in the popular ballads.

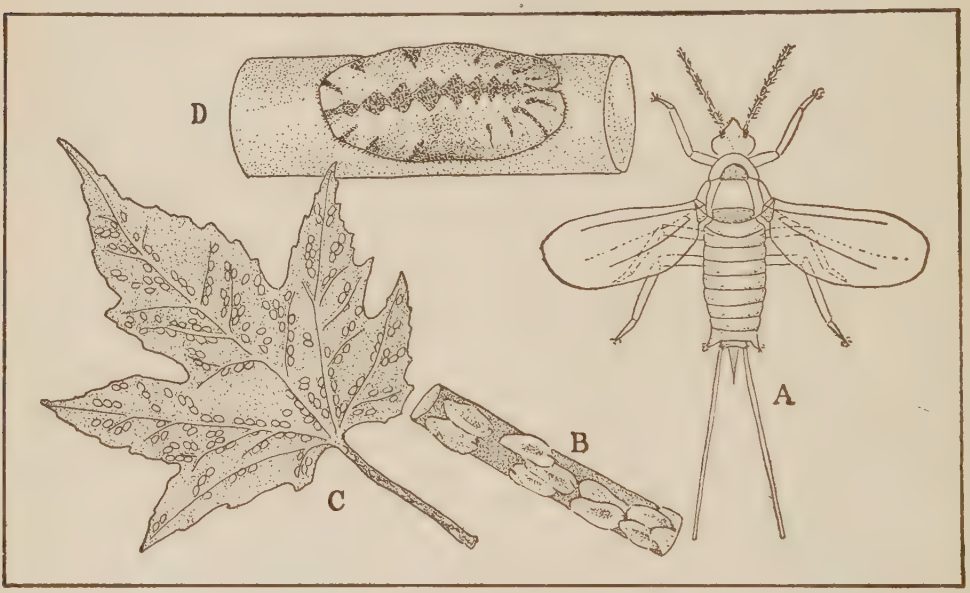
Scale Insect, a family of curious and harmful insects, well known in all fruit-growing areas. The family belongs to the order Hemiptera, but differs from the other families of the order in the degenerate character of its members. The females of this family are of decidedly low order. The majority of them remain motionless almost throughout life and are without legs, wings, antennæ or eyes. The males are better off in respect to organs of locomotion, for they have legs and wings, but they lack mouths, and, not being able to feed, live only a few hours or days at most. All secrete a more or less waxy substance, which, shell-like, forms a part of the body, or remains as a removable coat of wax. Scale insects are very prolific, and it is estimated that one pair may produce 1,000,000,000 offspring in one season. It is easy to overlook the inoffensive little scales upon leaves and branches when they first appear, but their rapid multiplication renders them speedily an almost unconquerable pest.

The cushion scale which threatens to destroy the orange crop of California, the San José scale and the black scale, which infests all food and garden shrubs, are well known. The following books discuss the habits of these insect pests and methods of extermination: R. Hooper Pearson, *The Book of Garden Pests;* F. V. Theobald, *Insect Pests of Fruit;* John B. Smith, *Our Insect Friends and Enemies;* Saunders, *Insects Injurious to Fruit.* The United States Department of Agriculture and those of all fruit-growing states have numerous helpful

bulletins upon the subject. See San José Scale; Mealy Bug; Insecticide.

Scallop, *Skol' up,* a family of Mollusca having a bivalve, or hinged, shell. These shells, by which the scallops may be distinguished, are fan-shaped and marked by distinct ridges which proceed from the hinge and spread outward; there are also transverse ridges which mark the growing periods of the shell. At the hinge is a triangular protuberance known as the ear. Scallops generally rest upon the right valve, which is comparatively flat and pale in color; the left is apt to be more brilliant in hue. The young secrete a sticky substance, called the byssus, which they can weave into a net or cord and use to attach themselves to rocks or shells in favorable locations. The adult scallops do not attach themselves, but plow through the mud by means of a wedge-shaped foot. This foot is the edible part of the scallop and is soft, white and tender. There are four gills and a fringe of brightly-colored eyes which may be protruded from the shell; all these are governed by a complicated nervous system and nourished by a good circulatory system. The scallop passes through several changes before reaching maturity, and its age limit is from 20 to 30 months.

Along the New England coast scallops are gathered in great numbers; the foot is eaten and the shells are used for various purposes: as cups and plates, as cultches in oyster beds and as dishes for "scalloping" oysters. The pilgrim scallops were so named because many of the returning Crusaders picked them up in Palestine and wore them as tokens that they had been in the Holy Land. See Mollusca; Oyster.



SCALE INSECT

A, moth; B, scales on a branch; C, scales on a leaf; D, a scale magnified.

Scalp, *Skalp,* the outer covering of the upper part of the skull. The hair grows more luxuriantly on the scalp, but with this exception the skin of the scalp varies but little from that on other parts of the body. Beneath the skin there lie an expanded tendon and intervening tissues containing the blood vessels. Injury to the scalp is liable to be followed by erysipelas, and such injury should receive careful treatment.

The scalp was formerly considered by the American Indians the trophy of victory, and the warrior always cut from the crown of his victim a circular piece of the scalp about four inches in diameter which he dried and preserved with the hair. Each warrior boasted of the number of scalps he had taken.

Scammony, *Skam' o ny,* a climbing plant of the Honeysuckle Family growing wild in Asia Minor. The stem, which has a thick, milky juice, rises from a fleshy root and bears tapering, arrow-shaped leaves. The flowers are white. The plant is grown in southern Europe for the sake of its long root, from which a gum resin and a medicine which is useful as a cathartic are made.

Scandinavia, *Skahn" di na' vi a,* a name applied to the three kingdoms of Norway, Sweden and Denmark, or, geographically, to the great peninsula including Norway and Sweden alone. It has no political significance, and the name was first given by the Romans to an island which they thought lay north of the Baltic Sea.

Scape'goat", in the Authorized Version of the Bible, the name given to one of the two goats used in the sin offering for the Israelites, on the great Day of Atonement. This was the goat which was loaded with the sins of the people and sent into the wilderness. See *Leviticus xvi, 21-22.*

Scarabæus, *Skar" a be' us,* a family of large and brilliantly-colored beetles widely known from the many species, which at present number over 13,000; because of the number of species it is difficult to characterize the family as a whole. Members of the group are chiefly known by the six ventral segments of the abdomen, the feathery antennæ and the size and brilliancy of the body.

The two main divisions of the family are the dung beetles and the chafers. The former are scavangers and include such species as the tumblebugs; the chafers include the June bugs and cockchafers and others which are extremely destructive to leaves and tender stems of plants. The larvæ are white, soft-bodied maggots, which generally lie buried in heaps of refuse and decaying vegetable matter; many do great damage to the roots of grasses and other plants. The adult beetles have coats of a shinier, metallic luster, which are golden, blue, red and green in hue. One species was held sacred by the Egyptians because the ball of refuse which it rolled for the storage of its eggs was held to be emblematic of the world. A conventionalized design of this beetle was carved upon buildings and walls, and stones and gems were cut in its form. Many of these, some of great size, are still found in Egyptian ruins and were probably used as charms. See COLEOPTERA.

Scar'let Fe'ver, a highly contagious disease which is often fatal. It sometimes attacks adults, but is more prevalent among children. It starts with a cold and sore throat, followed by high fever, inflammation and eruptions of the skin. There are three distinct forms of the disease: scarlatina simplex, a mild form, which sometimes merges into other ailments; scarlatina anginosa, which is characterized by high fever, ulceration of the throat and rash; and scarlatina maligna, a violent form of the disease which often proves fatal. Its symptoms are headache, eruptions of the skin, and swelling of the tonsils and throat. The scarlet-fever patient is exceedingly susceptible to bacterial infection, and should be guarded against pneumonia, diphtheria and other infectious diseases during the progress of the fever and also during convalescence. Care should be taken to isolate the patient for six or eight weeks after a subsidence of the fever, as the germs have been known to persist for some time in clothing or bedding and in the dead skin which peels from the body after the fever has passed.

Schaeffer, *Sha' fer,* **Nathan C.** (1849-1919), an American educator, born in Berks County, Pa. He graduated at Franklin and Marshall College in 1867, and after studying theology went to Germany, where he pursued courses in the universities of Berlin, Tübingen and

Leipsic. For two years he was professor at his alma mater, served for 16 years as principal of the Keystone State Normal School, and in 1893 was chosen state superintendent of public instruction of Pennsylvania. He has edited numerous publications, is a frequent contributor to educational journals, and has written *Thinking and Learning to Think* and a *History of Education in Pennsylvania.*

Scheele, *Sha' le,* **Carl Wilhelm** (1742-1786), a Swedish chemist of note whose investigations led to the recognition of many chemical substances. He separated and recognized baryta, tartaric acid, chlorine, oxygen, glycerin and arsenite of copper, the last of which, as a pigment, is also known as Scheele's green. In 1782 he obtained hydrocyanic acid, then prepared for the first time. Scheele began his experiments and investigations while an apothecary in Stockholm. Later he removed to Upsala and gave up his entire time to scientific work.

Schelde, *Skel' de,* or **Scheldt,** *Skelt,* a river in Belgium and Netherlands, rising in the Department of Aisne, in France. It flows north and east into Belgium, and 15 m. below Antwerp branches into the East and West Schelde and forms the double estuary which merges with the Rhine delta and opens into the North Sea. The total length is 267 m., all except 50 of which are navigable. Through a system of canals it connects with the important cities of Belgium and northern France, and is a significant commercial waterway of Europe. In 1863 it was made a free river by the Treaty of Brussels; before that, the Dutch enjoyed a monopoly of the navigation of its lower part and levied a toll on foreign vessels.

Schelling, *Shel' ing,* **Friedrich Wilhelm Joseph von** (1775-1854), a German philosopher, born at Leonberg, in Württemberg, the son of a country clergyman. He was very precocious and entered the theological seminary at Tübingen in his sixteenth year, where he devoted himself chiefly to Kant's philosophy. After completing his course he went to Leipsic as a tutor, but soon repaired to Jena, where he became the pupil of Fichte, whom he afterwards succeeded. In 1803 he became professor of philosophy at Würzburg. Three years later he went to Munich as member of the Academy of Arts, of which he later became secretary. From 1820 to 1826 he lectured at Erlangen; the next year became professor at the newly-established University of Munich; and in 1841 went to Berlin as member of the Academy of Sciences and university lecturer.

Schelling begins his philosophy with Fichte, but later develops his own system. This is not expressed anywhere in finished form, however, but consists of a series of formative steps, with continual return to the beginning in the search for new foundations. It is therefore difficult to summarize his philosophy. In general terms it may be characterized as objective idealism, and marks the transition from the subjective idealism of Fichte to the absolute idealism of Hegel. He began his work before the latter, during whose reign in German philosophy he preserved silence; but he outlived Hegel and criticized his philosophy as being too exclusively idealistic and not giving sufficient recognition to empirical reality. Schelling called his later speculation positive philosophy to distinguish it from his earlier speculation on identity, which he called negative philosophy.

Schenck, *Skenk,* **Robert Cumming** (1809-1890), an American soldier and diplomat, born in Franklin, Ohio. He graduated from Miami University in 1827, was admitted to the bar in 1831 and, settling in Dayton, became actively interested in politics. In 1840 he was in the State Legislature, from 1843 to 1851 he sat in Congress and from 1851 to 1853 he was minister to Brazil. At the outbreak of the Civil War he became brigadier-general of volunteers, seeing his first service near Vienna, Va., and engaging at Bull Run. After the battle at Cross Keys Fremont made him division commander, and at the second battle of Bull Run his right arm was shattered by a ball. Later he was promoted

major-general of volunteers and commanded at Baltimore, but in 1863 he resigned from the army to enter Congress, where he remained until 1871. That year he was appointed minister to England, where he served until his resignation in 1876.

Schenectady, *Ske nek' ta dy,* **N. Y.,** a city and county seat of Schenectady Co., 17 m. n.w. of Albany and 17 m. w. of Troy. It is situated on the Mohawk River and the Erie Canal and on the New York Central & Hudson River Railroad. The Boston & Maine Railroad also connects at Scotia, a suburb of the city, and the West Shore Railroad at South Schenectady. There is excellent interurban electric service to Mechanicsville, Albany, Troy, Gloversville, Johnstown, Saratoga, Glens Falls and other towns and cities. The more elevated sections of the city are principally residential. Schenectady is situated in a fertile agricultural region in the beautiful Mohawk Valley, and is an important manufacturing and commercial center.

Public Buildings. The city contains many examples of Dutch and early American architecture. Among the most noteworthy buildings are the city hall, courthouse, Van Curler Opera House, Y. M. C. A. and a state armory. There are about 67 churches and chapels.

Institutions. Schenectady is the seat of Union University (undenominational), founded in 1795 under the name of Union College, and embraces, besides the college proper, the departments of law and medicine and the Dudley Observatory, located in Albany. Other educational institutions include several private schools, a business college and a number of libraries. Among other institutions are the Ellis Hospital, Home of the Friendless and a Children's Home.

Industries. The city has important industrial establishments, comprising locomotive, boiler and engine works, electrical apparatus works, motor and supply works, flour, lumber and planing mills, brush and broom factories, tobacco and cigar factories, foundries and machine shops, harvesting machine works, bottling works and manufactories of hosiery and knit goods, wall plaster, baseball supplies, mattresses, overalls, mica insulators, patent medicines, oils and varnishes, gasoline fire engines, wagons and carriages, stoves and bakeries. The vast plants of the General Electric Company and the American Locomotive Company are located here.

History. Much historic interest is attached to the city. According to tradition Schenectady stands on the site of the chief village of the Mohawk Indians. The place was settled in 1662 by Arendt Van Corlear, and letters patent were granted in 1684. Six years later the village was attacked by a force of French and Indians, who massacred many of the inhabitants and burned the town. In 1748 another Indian massacre occurred in the immediate vicinity. Among the early steam railroads in the United States was one from Schenectady to Albany. The borough was incorporated in 1765 and chartered as a city in 1798. Population in 1920, 88,723.

Schiller, *Shil' er,* **Johann Christoph Friedrich von** (1759-1805), a German poet and dramatist, born at Marbach, Württemberg. Duke Karl of Württemberg carried him off, against his will, to the military academy at Ludwigsburg, and there Schiller was generally unhappy, but read widely in Shakespeare and in the "Storm and Stress" writers of the period, and also secretly began to write poetry. He entered service as regimental surgeon in 1780, with rebellion and protest. The following year he published his first drama, *The Robbers,* at his own expense. Three other plays, *Fiesco, Luise Millerin* and *Don Carlos,* soon appeared. He lived in Mannheim and literary Weimar, came under the influence of Wieland, Körner and Herder, and turned gradually to historical studies. In 1788 he met Goethe. His prose studies continued and the results of his efforts were a history of the Thirty Years' War and a remarkable critical essay, *On the Naïve and Sentimental in*

Poetry. Then he returned to poetry and revealed an extraordinary maturing of his powers. In 1799 appeared the exquisite lyric, *The Song of the Bell.* For a long time he reworked his masterly productions, *Wallenstein* and *Maria Stuart,* two of the finest dramas that had been presented on the German stage. Another drama, *The Bride of Messina,* was too strictly classical in its severe simplicity to become wholly popular. His great work, *Wilhelm Tell,* was finished in 1804. It created a tremendous impression on the stage and met with unrivaled success. In his hero he found a type dear to the German heart and one that is essentially national. Not even Goethe, the greater genius, has been so widely read or greatly loved among his countrymen as has Schiller, with his permanent contributions to cosmopolitan literature.

Schlegel, *Shla' gel,* **August Wilhelm von** (1767-1845), a German critic and poet, born in Hanover, Germany. His lectures on æsthetics at Jena and his translations of Shakespeare were influential, and with his brother he won distinction as the editor of the *Athenäum,* a journal of high and severely critical standards. He lectured on literature and art at Berlin in 1801, at which time some of his earlier productions began to appear. Three years later he became tutor to the children of Madame de Staël. He traveled extensively, and in 1818 he was appointed professor of history in the University of Bonn, where he devoted a part of his time to philological researches, especially in Sanskrit. His works and collections include *Characters and Critics, The Spanish Theater, Wreaths of Italian, Spanish and Portuguese Poetry, A Comparison of the Phèdre of Euripides with that of Racine,* and *Lectures on Dramatic Art and Literature.*

Schlegel, Friedrich von (1772-1829), a German historian and critic, born in Hanover. Like his brother, August Wilhelm von Schlegel, he studied at Göttingen and later became connected with the *Athenäum.* He lectured on philosophy at Jena and Paris, published works which showed a mixture of classical and romantic elements, and upon settling at Cologne in 1804 he soon joined the Roman Catholic Church. In 1808 he went to Vienna, became secretary to the Archduke Charles and was vehement in his proclamations against Napoleon. He later lectured at Dresden and Vienna on *The Philosophy of History and the Philosophy of Language.*

Schleswig-Holstein, *Shlaz' vik-Hole'-shtine,* the name of the isthmus connecting Denmark with the main land of Europe. It comprises the three mainland provinces of Schleswig, Holstein and Lauenburg, and of many small islands, especially in the Baltic; its entire area is 7338 sq. m. In general the country is but a few feet above sea level, or even below it, and must be defended from the sea by dikes. The Baltic coast is slightly higher and has several good harbors. The raising of cattle and horses is the chief industry, but Eckernforde is the greatest fishing port of Prussia, and Kiel, chief naval station of Germany, is famous for its foundries and shipbuilding. Schleswig, the capital, is a small city; Altona, on the Elbe, and Kiel outrank it in importance.

Schleswig and Holstein formerly were under Danish control, but with the understanding that they were not to be wholly united with Denmark nor separated from each other. When, in 1848, an attempt was made to unite Schleswig with Denmark, difficulties arose which lasted until 1864, when Bismarck enlisted the aid of Austria with Prussia to end Danish rule. Holstein was then placed under control of Austria and Schleswig under control of Prussia. This condition lasted but two years, when the Seven Weeks' War left both provinces in the control of Prussia.

But since a large element of the population is Danish and since the province was forcibly taken from Denmark, but recently, the Treaty of Versailles gives the citizens a chance to vote whether they are to remain a state of Germany or return to Denmark. The province is

divided into three zones, each of which will vote separately on this question. Not until the last vote has been taken, can we determine the future of the province. In 1920 the first zone by an overwhelming vote decided to return to Denmark, the second to remain with Germany.

Schley, *Sli,* **Winfield Scott** (1839-1911), an American naval officer, born in Frederick County, Md., and educated at Annapolis. In 1860 he cruised on the *Niagara* to China and Japan, in 1863 participated in engagements leading to the surrender of Port Hudson, became commander in 1874, and ten years later, in charge of the Arctic Relief Expedition, rescued Lieutenant Greely at Cape Sabine. As captain he went to Valparaiso, Chile, with the *Baltimore* in 1891, there settling disturbances, and shortly afterwards conveyed the remains of John Ericsson to Sweden, for which service the King of Sweden awarded him a gold medal. In the Spanish-American War he was attached, as commodore, to Sampson's command, and was in temporary charge of the American fleet, which comprised his Flying Squadron and the North Atlantic Squadron of Sampson, when Admiral Cervera attempted to escape from Santiago Harbor, July 3, 1898. He was retired in 1901, with the rank of rear-admiral, and in 1904 he published *The Fight Off Santiago* and *Forty-five Years Under the Flag.*

Following the war with Spain, criticisms were made as to the credit for the victory at Santiago and on Admiral Schley's conduct during the war. In July, 1901, he requested a court of inquiry to investigate his conduct, and accordingly such a body, consisting of Admiral Dewey, as president, and rear-admirals Benham and Ramsay, met in Washington on Sept. 21. On Dec. 13 the court gave the decision, commending Schley's conduct at Santiago, but censuring severely his previous conduct of the Flying Squadron.

Schofield, *Sko' feeld,* **John McAllister** (1831-1906), an American soldier, born in Chautauqua County, N. Y., and educated at West Point. Having instructed in natural philosophy at West Point and at Washington University, Mo., he became major of the First Missouri Volunteers at the outbreak of the Civil War. In November, 1861, he was made brigadier-general of volunteers, and did effective work while commanding, in turn, the Missouri militia, the District of St. Louis and the Army of the Frontier. In November, 1862, he was made major-general of volunteers, and during Sherman's Georgia campaign of 1864, rendered his most conspicuous service to the Union. Subsequently he was active in the campaign against Hood in Tennessee, until the engagement at Nashville, when he was sent to North Carolina, capturing Wilmington, and being otherwise active until the surrender of Johnston. In 1868 he became secretary of war to succeed Edwin M. Stanton. The following year he became major-general of the United States army, later being made general-in-chief, and in 1895 he was promoted lieutenant-general, but retired some few months later. He published *Forty-six Years in the Army.*

Schoolcraft, *Skool' kraft,* **Henry Rowe** (1793-1864), an ethnologist and geologist, born in Watervliet, N. Y., and educated in Union College. In 1822 he became Indian agent at the Falls of St. Mary and later served in a similar position at Mackinaw, where he married the granddaughter of an Indian chief, meanwhile investigating the language, ethnology and antiquities of the Indians. In 1832 he headed a second government expedition to the upper Mississippi to discover the real source of that river, and four years later, by a treaty with the Indians on the upper lakes, he procured 16,000,000 acres in this region for the government, being appointed chief disbursing agent for the Northern Department. Subsequently he visited Europe and was employed by New York State to make a census and gather statistics of the Six Nations. His works include *Historical and Statistical Information Respecting the History, Condition and Prospects of the Indian Tribes of the*

United States and *Personal Memoirs of a Residence of Thirty Years with the Indian Tribes on the American Frontiers. The Indian Fairy Book,* compiled from his manuscripts, appeared in 1868. He is considered one of the best authorities on the American Indians, but most of his works are out of print.

School Garden, a plot of land reserved in connection with a school and upon which vegetables, shrubs and flowers are raised by the pupils. Strange as it may seem, school gardens were first suggested by Comenius (1592-1670) (see COMENIUS, JOHANN AMOS), who said that a school garden should be connected with every school, where children at times might feast their eyes on trees, flowers and herbs, and be taught to enjoy them. Although Pestalozzi and Froebel both made use of such plans, the gardens were not frequently established until 1869, when the Austrian Government passed a law requiring the establishment of a school garden in connection with every rural school. In 1889 Austria had 18,000 such gardens, and the movement, spreading, met with such enthusiastic welcome that at present there are over 100,000 school gardens in Europe. The first garden in the United States was begun by Henry L. Clapp in connection with the George Putnam Grammar School, Roxbury District, Mass. Its success, both as a means of acquiring first-hand knowledge and of furnishing a pleasing and rational sort of physical culture, has led to the growth of the movement, until now school gardens are found in every state of the United States.

The development of the movement has come about not so much through the teachers as through the leaders in social work and those interested in agricultural advancement. The first class desires to reach the children of the cities, and especially those not interested in the so-called regular school work; the latter aims to make the country child's surroundings significant to him. The school garden not only furnishes a pleasing way of studying nature, botany, geology, manual training and physical exercise, but it readily correlates with arithmetic, language, geography, history and drawing. Its advantages cannot fail to appeal to all interested in educational work.

The school garden should be located as near as possible to the school for reasons which must be obvious—time will be saved; it will prove an object lesson to the entire school; a special teacher is not required; shelter from storms is near at hand, etc. It should, if possible, be on neither low nor high ground, and should have a southeast or southwest aspect. In the beginning it should not be so large as to be unmanageable, and yet it must be of sufficient size to be useful. In general, those already established have been laid out in oblong plots, separated by paths, and each plot is given to one or two pupils for their share of the garden. The work should be supervised by a teacher who is able to instruct the pupils about the soil, the kind of fertilizer needed, the plants fitted to that soil and the treatment needed. As far as possible, the pupils themselves should be allowed to choose, under advisement, the kind of plants which they wish to grow. The aims of the school garden are the healthy interest in school, the cultivation of observation, and finally the home garden, which is the test of the success of the school garden.

Excellent books on school gardens are available. Among the best are: Weed-Emerson, *The School Garden Book;* Williams, *Suggestions for School Gardens;* Elford and Heaton, *Practical School Gardening.* Albert F. Carter of the Colorado State Normal School, Greeley, Colo., has published a pamphlet on the *Bibliography of School Gardens,* which gives a list of books, pamphlets and magazine articles upon the subject. See also Kern, *Among Country Schools.*

Schools. See COMMON SCHOOLS; EDUCATION, NATIONAL SYSTEMS OF.

Schools, Correspondence, institutions which give instruction by personal and circular letters, written or printed outlines, and by various other means adapted from the most effective of those used

by teachers who regularly face their pupils in the classroom. In many cases these schools meet a very real need; while in thousands of other instances they enable individuals to gratify a longing for knowledge which could not otherwise be secured. Few of them are even yet maintained by the universities or colleges which are supported by public taxation.

Instruction by correspondence was first successfully carried on in Germany, about 1856, although the thought had been suggested and somewhat tentatively applied in England before that time. The correspondence courses established in connection with the Chautauqua Movement were the first of the kind in America. Its correspondence university, organized in 1884, immediately won popular approval. Because Dr. William Rainey Harper had been highly successful in the courses which he either personally prepared, or directed, for the Chautauqua institution, he later, as president of the University of Chicago, established as an integral department of that institution a correspondence department which offers courses in more than thirty departments of the university, and any student enrolled may take by correspondence one-third of the work for a degree. Other large universities, in all parts of the world, are gradually adopting these methods, especially in connection with what are known as university extension departments. Especially notable in this field is the University of Wisconsin, which successfully, and with unprecedented thoroughness, promptly meets every educational problem recognized by the people of the commonwealth.

The International Correspondence Schools of Scranton, Pa., form the largest institution of this sort, and enroll over 1,000,000, embracing all countries in the world, including in the courses of study practically all subjects found in public schools, colleges and universities. See EDUCATION; CHAUTAUQUA MOVEMENT.

Schooner, *Skoon' er.* See SHIP.

Schopenhauer, *Sho' pen how" er,* **Arthur** (1788-1860), a German philosopher, born at Danzig, Prussia. He entered Göttingen University in 1809, where he at first gave his attention to medicine, but returned later to the study of philosophy. In 1811 he heard Fichte in Berlin, and in 1813 took his degree from Jena. During the following winter he studied Oriental philosophy, and met Goethe, at whose instigation he studied color. From 1814 to 1818 he lived at Dresden and wrote a work on optics; and also the work that has given him fame, *The World as Will and Idea.* He then traveled in Italy, returning to Berlin in 1820. Here he attempted to lecture in competition with Hegel, but failed to get a hearing. He returned to Italy, but later made another unsuccessful attempt to lecture in Berlin. In 1831 he retired to his home at Frankfort-on-the-Main, where he spent the remainder of his life in study.

German philosophy after Kant found its new starting point in the attempt to reconcile the two contradictory elements in his system, and developed into idealism, on the one hand, and realism on the other. Schopenhauer tried to retain both factors, and claimed that he was the true successor of Kant; but in fact he worked out a rigid system of realism. This he did by defining Kant's "thing-in-itself" as *will.* "The only necessary reality in the universe is will." By this, however, he does not mean will as personal and conscious choice, but a blind, unconscious force. It has no independence of action, whether in the individual or as the absolute, and aims at no rational end. There is, therefore, no hope of things becoming better. The proper attitude of mind is that of passive acquiescence, and the stilling of the desires and appetites. In this respect his philosophy very nearly coincides with Buddha's Nirvana. Schopenhauer's system has become the classic of philosophical pessimism.

Schouler, *Skool' er,* **James** (1839-), an American lawyer and historian, born at Arlington, Mass., and educated at

Harvard. He was admitted to the Massachusetts bar in 1862 and appointed to the Supreme Court of the United States in 1867. He delivered law lectures in Boston University, 1882-1902, and in the National University at Washington, 1888-1908, and was lecturer in history at Johns Hopkins, 1891-1908. Besides being the author of various law books, he has written a *Life of Thomas Jefferson, Historical Briefs, Alexander Hamilton, Eighty Years of Union, Americans of 1776, Ideals of the Republic* and a six-volume *History of the United States.* This treats of the period from 1783 to 1865 in a masterly fashion, and emphasizes the political, without neglecting the social phases, of the considered time.

Schubert, *Shoo' bert,* **Franz Peter** (1797-1828), one of the greatest of the world's composers, born at Vienna. Having been taught at home the rudiments of piano and violin playing, he was sent to the best violin school in Vienna; but he learned his art chiefly through independent study of musical masterpieces and through intercourse with a brilliant coterie of fellow musicians. He addressed himself with indomitable perseverance to the works of Mozart and to a study of the rules of musical composition. Lack of recognition and consequent poverty reduced him to the necessity of teaching school, but he continued to compose, working in spare moments and with feverish haste. Many composers have been known to work with incredible speed; but in the year 1815, which belongs to this period, Schubert established a record for accomplishment that has never been approximated. His death at the age of 32 was the result of overexertion. Schubert possessed a radiant personality and had a perfect genius for friendships, and he was peculiarly blessed with loyal friends. But these constituted almost the only compensation in a life of unremitting toil, dire poverty and cruel disappointments.

Schubert was one of the greatest song writers that ever lived. The lyric poems of Goethe and Schiller he set to music; and he only fell short of operatic greatness because of the weakness of his librettos. He has been said to fall short of Mozart in clearness and lucidity and of Beethoven in perfection of musical structure, but in freshness and vivacity of musical ideas he was without a peer. In him the poetic and musical sensibilities were beautifully blended. He wrote 600 songs, 10 symphonies and 15 operas, besides a large number of miscellaneous works. Of world-wide fame are his Shakespearean songs, *Who Is Sylvia?* and *Hark, Hark, the Lark;* also *The Erlking* and the *Unfinished Symphony.*

Schumann, *Shoo' mahn,* **Robert Alexander** (1810-1856), a celebrated German musical composer and critic, born at Zwickau, Saxony, the son of an editor of distinction. For a brief period he studied law at Leipsic; but was unable to resist the compelling force of musical inclinations, and at the age of 20 he began piano lessons with Friedrich Wieck. His eagerness to perfect his technique led to a series of exercises which permanently disabled his right hand. Thereafter he gave his attention to composition and criticism. His journal, *The New Magazine of Music,* founded in 1834, greatly influenced musical taste and first brought to public prominence musicians who afterwards were recognized as preeminent in their profession.

The year 1840 was one of the most fruitful in the composer's life. In it he produced some 150 songs of wonderful lyric beauty, using the poems of Goethe, Rückert, Heine, Byron, Burns and Moore. He also wrote two of his four symphonies; and the year following appeared some of his best chamber music. Two academic honors were conferred upon him during this period—a doctor's degree at the University of Jena and a professorship in the Conservatory of Leipsic. He became musical director at Düsseldorf in 1850, but ill health caused him to give up this position three years later. The year following his mind gave way under a severe nervous disorder which had been coming on several years, and he died shortly afterwards.

Schumann labored painstakingly for the advancement of music, and some of his compositions occupy a place beside the greatest of the world's works of art. His greatest achievements were *Paradise and the Peri*, the *Symphony in B* and the *Manfred Symphony*.

Schumann-Heink, *Shoo'mahn-Hinke'*, **Ernestine** (1861-), a dramatic contralto singer. She was born (Ressler) near Prague. After many struggles she obtained a musical education and made her operatic début in Dresden in 1878, singing Azucena in *Il Trovatore*. In 1905 she was married to William Rapp, Jr. Madame Schumann-Heink has a winning personality and a voice of exceptional lyric beauty; she enjoys a wide popularity in Europe and in America as a singer of Wagnerian rôles.

Schurman, *Shur' man,* **Jacob Gould** (1854-), an American educator, born at Freetown, Prince Edward Island. He was educated in Canada and at the universities of London and Edinburgh, afterward spending two years in the study of philosophy at Heidelberg, Berlin and Göttingen. He was appointed to a professorship in Acadia College, Nova Scotia, in 1880; and subsequently to a professorship in Dalhousie College. Having accepted the chair of philosophy at Cornell University, in 1886, he became dean of the Sage School of Philosophy there in 1891. The following year he was made president. He was appointed by President McKinley in 1899 as a member of the Philippine Commission; and was temporarily relieved of his duties at Cornell in order that he might devote the greater part of that year to the study of conditions in the archipelago. He is the author of *The Ethical Import of Darwinism, Belief in God* and *Agnosticism and Religion*.

Schurz, *Shoortz,* **Carl** (1829-1906), a German-American soldier, orator and politician, born in Liblar, Prussia, and educated at the Gymnasium at Cologne and at the University of Bonn. He early became interested in the publication of a liberal newspaper, and on the failure of an attempted insurrection at Bonn, 1849, fled to Switzerland, and later to Philadelphia, where he arrived during the summer of 1852. Three years later he settled in Watertown, Wis. During the presidential campaign of 1856 he attained note as a German orator; the following year he was defeated as Republican candidate for lieutenant-governor; in 1858 he began to make speeches in English, and he soon afterwards became a lawyer of recognized eloquence in Milwaukee.

Having served for a time as minister to Spain, where he was sent by President Lincoln, Schurz resigned to become brigadier-general in the Federal army in 1862. He fought at Bull Run, Chancellorsville, Gettysburg and Chattanooga, and following the war he went to the South as commissioner, reporting conditions which caused Congress to adopt radical reconstruction methods. Later he was a newspaper correspondent and finally editor of the St. Louis *Westliche Post*. In 1869 he was chosen United States senator from Missouri, in which capacity he opposed some of the leading measures of Grant's administration, and led in organizing the Liberal Republican Party, which nominated Greeley in 1872. He was secretary of the interior from 1877 to 1881, editor of the New York *Evening Post* from 1881 to 1884, and from 1892 to 1901 was president of the National Civil Service Reform League.

Schuyler, *Ski'ler,* **Philip John** (1733-1804), an American soldier and statesman, born at Albany, N. Y., of Dutch descent. The family was one of wealth and influence and was related to the other aristocratic Dutch families of the colony. Schuyler served in the French and Indian War, as captain and then as deputy-commissary with the rank of major. He was elected to the New York Colonial Assembly; 1768. In May, 1775, he was a delegate to the Second Continental Congress, and the following month was one of the four major-generals chosen for the Continental army. Being given charge of the Northern Department of New York, he prepared to invade Canada, but had to relinquish

command of the expedition to Richard Montgomery because of illness. Later he fought the Loyalists and their Indian allies in the Mohawk Valley and made a treaty with the Six Nations.

In the meanwhile he had been so persecuted by Gates, who was jealous of him, and by New Englanders, who resented his position in the New York-Massachusetts controversy, that he sent in his resignation, which, however, was not accepted. He was later superseded by Gates, Aug. 19, 1777, because of the withdrawal of the Americans from Crown Point and the evacuation of Ticonderoga, though to him was largely due the credit for Burgoyne's capture. A court-martial appointed in October, 1778, acquitted him on all charges with high honor; but he resigned unconditionally in April, 1779.

Schuyler was one of the leading Federalists from New York in Congress, where he served until 1781. He was elected a United States senator in 1789 and in 1797, resigning in the latter term because of ill health. See SARATOGA, BATTLES OF.

Schuylkill, *Skool' kil,* **River,** a river of Pennsylvania. It rises near Pottsville, flows in a southeastward direction, and enters the Delaware in the southern limits of Philadelphia, which is built on both banks of the stream. It is about 130 m. long, and by dams and locks has been made navigable for coal barges. The Schuylkill is noted for its beautiful valley. It also supplies Philadelphia with nearly all the water used by that city.

Science, *Si'ens,* (Latin *scientia,* from *scire,* to learn, to know), a term used to designate systematized and classified knowledge. More specifically, it is used of such knowledge when it relates to the physical world and its phenomena, natural science. It is also used of any department of systematized knowledge considered as a distinct field of study; as, linguistic science, social science.

Science is distinguished from *philosophy* and *art.* Science studies existing phenomena as it finds them to hand, observing, analyzing and classifying them with a view to the discovery of their general truths or laws, but without inquiring into their ultimate nature or ground, or attempting to combine their conclusions into a systematized conception of life as a whole. This last is the task of philosophy, which deals with the presuppositions of knowledge and of phenomena and with the organization of knowledge in all fields into a coherent, intelligent system. Art, on the other hand, takes the discoveries of science and adapts them to the uses of human life by means of invention and concrete application in the world of affairs.

The spirit of science, therefore, is not speculative, but experimental. Its method is inductive, not deductive. Given, the earth, the sea, the air, the stars, what can we find out about them by observation and classification? Given, the phenomena of life on the earth, plant, animal and human, what knowledge of them can be discovered by a first-hand study? This attitude of mind is distinctively modern, although not exclusively so. The study of nature is as old as humanity, and the beginnings of science reach far back into antiquity. The Egyptians, the Assyrians, the Greeks, the Romans, all made attempts to understand the universe; and such writers as Euclid, Ptolemy and Aristotle made distinct contributions toward that end.

Nevertheless, science as understood today is essentially a modern creation, dating from that remarkable period of new beginnings in the 16th century when men turned from traditional interests to the exploration and study of the actual world in which they lived. Copernicus, Galileo, Kepler, Francis Bacon,—these men were the creators of modern science. Their successors are too numerous to mention, but familiar names are Newton, Laplace, Lyell, Comte, Darwin, Tyndall, Huxley, and Spencer. These are but the leaders of a great army of workers who have built up the vast structure of scientific knowledge. It is not too much to say that modern science has introduced a wholly new epoch in thought and in education.

Various efforts have been made to classify the sciences. In modern times one of the first and most influential of these was that of Auguste Comte in his *Positive Philosophy*. He made his classification on the basis of the subject matter treated by the various sciences and the relationships existing between them. Beginning with the simplest and most general, he proceeded to the more complex and particular in the following "hierarchy," or arrangement in order of value: mathematics, astronomy, physics, chemistry, physiology, sociology. Further differentiation has added psychology to the list, between physiology (in which Comte included it) and sociology. This classification may be regarded as fairly covering the various fields of science, if we remember that each science is subdivided into many specialized departments. See PHILOSOPHY.

Scioto, *Si o′ to,* **River,** a river of Ohio. It rises north of the west-central part of the state, flows eastward, then southward and enters the Ohio near Portsmouth. It is about 225 m. long and is navigable for 130 m. The Ohio and Erie Canal extends along the Scioto from Columbus to its mouth.

Scipio, *Sip′ i o,* **Publius Cornelius** (237-183 B. C.), a Roman warrior, known in history as *Africanus Major*. He won Spain for Rome while Hannibal was invading Italy during the Second Punic War. In 207 B. C. he was made consul, and by carrying the war into Africa he forced Hannibal to return to defend his country (See HANNIBAL). After the victory of Zama in 202 B. C. he returned home, was honored with a triumph and given the surname *Africanus*. The rest of his life he spent at his villa at Liternum.

Scipio, Publius Cornelius Æmilianus (185-129 B. C.), a Roman warrior, surnamed *Africanus Minor*. He was the grandson, by adoption, of Scipio Africanus Major. He so distinguished himself in the early operations of the Third Punic War that in 147 B. C., though not of legal age, he was chosen consul and commander of the forces against the Carthaginians. The next year he reduced the city of Carthage and, at the Senate's bidding, burned it, receiving, on his return to Rome, a splendid triumph. In 134 B. C. he was again consul, and in 133 B. C. he forced the capitulation of Numantia, thus establishing Roman dominion in Hither Spain. During the last years of his life he opposed the reforms of Tiberius Gracchus, and is thought to have been poisoned by a political enemy.

Scissor-Tailed, *Siz′ er-taled,* **Flycatcher,** a bird of the Flycatcher Family. This handsome bird is about the size of the robin in body, but its long tail gives it a greater length (15 inches). The body is grayish with a white throat; the under wing and tail coverts are salmon; the wings are blackish; the tail is deeply forked; the feathers are tipped with black, and the head is marked with red and has a concealed red spot on the crown. The nest is placed in low trees or thorny bushes, and is made of rootlets and plant stems and lined with feathers, wool and plant fibers. It contains five eggs, marked with brown and purple on a white ground. This is the most beautiful of the American flycatchers and is a familiar bird in the Southwest, where its erratic performances in the air fill the beholder with astonishment. In winter it migrates to Costa Rica.

Scorpio, *Skor′ pi o,* **The Scorpion,** the eighth sign of the zodiac. The constellation contains the bright reddish star Antares, and can be recognized by this star with a smaller star on each side of it and a long, curved row of stars to the west. The ancients believed Scorpio to be the sign of war, disease and woe. The symbol ♏ was supposed to represent the arrow-shaped sting of the scorpion.

Scorpion, a name given to an order of Arachnida, closely related to the spiders. The members of the order are distinguished from the spiders by their long segmented tails, which bear at their extremities sharp curved spines having poison glands. There are six pairs of appendages; the first pair is very short and the second very long; these bear the pincers and assist in grasping and crushing

the prey which has already been paralyzed by the poison; the last four pairs are the organs of locomotion. The young use their pincers to cling to their mother's body until they are able to care for themselves. Scorpions live in warm countries, where they burrow in the sand or hide in dark crevices by day, coming out at night to capture other spiders and insects. There are about 20 species in the United States, and they are abundant in the Mediterranean region. The bite of the scorpion is painful, but not especially harmful to man. External treatment with ammonia is beneficial.

Scorpion Fly, a name applied to an insect which in general appearance resembles the scorpion. The family belongs to the order Mecoptera, and is made up of 15 genera. In the adult form the scorpion flies have two pairs of netted wings and two large, pincerlike appendages upon the last segment of the body. They are, however, harmless, and scurry away from the presence of man. Their life history is not well known; the adult is developed from a larva which resembles the caterpillar, except that it has eight, rather than six, fleshy prolegs (See CATERPILLAR). In this state it feeds upon dead animal matter or decaying vegetable life about the banks of the streams, and for this reason it is a really useful member of society.

Scotch, *Skoch,* **Ter'rier,** a small quick dog of the terrier type, noted for its intelligence and affection. It has a low body with strong legs, and a head and neck large in proportion to its size. The muzzle is sharply pointed, the eyes bright and the large ears erect. There are two principal breeds, one having a short coat, but the most common having a rough, coarse coat of gray or black. The Scotch terriers make excellent pets because of their quickness in understanding, their liveliness and courage. Their usefulness consists chiefly in their skill in catching rats and other small Rodents. These terriers were first bred in the Scottish Highlands, and there the standard breed is recognized by its alert pose, its color and its erect tail.

Scotland, *Skot' land,* the northern part of the Island of Great Britain, occupying with its adjacent islands slightly more than one-third of the entire island. The Atlantic Ocean forms its northern and western boundaries, and the North Sea separates it from Norway. The Cheviot Hills, with the River Tweed at the east, and the long Solway Firth mark its separation from England. The coast is deeply indented with long bays and estuaries, whose rocky shores are lengthened by chains of barren islands. The narrowest of these long bays are termed lochs and the broad ones firths. Some of the largest of these are the Firth of Clyde, Loch Long, Loch Eil on the west, and Moray Firth, Firth of Tay and Firth of Forth on the east. From Moray Firth the narrower Inverness Firth opens into Loch Ness, a long enclosed arm of the sea that lies in a great trough, Glen More. By means of the Caledonian Canal these waters connect with Loch Lochy, Loch Linnhe and the Firth of Lorne, thus forming a continuous waterway between the North Sea and the Atlantic, and one which is much frequented by tourists.

SURFACE, RIVERS, LAKES. The northern half of Scotland is occupied by an elevated upland known as the Highlands. The rugged mountains rise to practically the same level, and the deep intersecting valleys, overgrown with heather and gorse, form the typical Scottish scenery unsurpassed for grandeur and wild beauty. Even yet much of the Highlands remains unexplored and inaccessible, a land to be viewed from a distance but not to be traversed. Though the average height of the mountains is 1500 ft., Ben Nevis (4406 ft.), just south of Loch Lochy, is the highest point of Great Britain, and Ben-Macdhui, Cairn Gorm and Benlawers are all far above the general uniform height of the mountains. South of the Highlands and separated from them by the Grampian Hills, lie the Lowlands, scarcely 500 ft. above the sea. Here lie the beautiful Scottish lakes, Lomond, Katrine and Tay, and many of the largest firths indent its shores. Still farther south are the South-

ern Uplands, the great grazing district, which extend to the English border in gently sloping hills and mountains never above 3000 ft. in height.

The climate of Scotland is, in general, pleasing and healthful. Though the summers are not so warm as those of England, the winters are generally more moderate, especially in the lowlands. The air is moist and in the more elevated sections the winds are chilling. The few forests of Scotland are chiefly of pine, but shrubby vegetation is more common than trees. The red deer, everywhere mentioned in Scottish tales, is the distinctive animal of the Highlands.

INDUSTRIES. From the nature of the country only a small per cent can be used for agricultural purposes. Oats and barley are raised, and vegetables supply the home demand. Sheep raising in the Southern Uplands is the most important branch of agriculture. The fisheries are an important source of revenue. Whale and seal fisheries have their center at Dundee, while all along the coast herring, haddock and cod are taken, and in the rivers salmon are abundant. The mountains contain coal and iron. Recently Scotland has become important among the manufacturing countries. On the Clyde are the greatest shipyards of the world. Glasgow manufactures cotton, machines and chemicals; Paisley is famous for its shawls; and Dundee for its linen, jute and machinery. Edinburgh is one of the greatest publishing centers of the world. Other manufactures center about Aberdeen, Kilmarnock, Leith and Greenock and comprise the paper, glove, hosiery, carpet, glass, sugar and the famous Scotch whiskey industries.

PEOPLE, GOVERNMENT AND EDUCATION. The people of Scotland are a sturdy race, of Celtic descent, and are usually of more serious turn of mind than their neighbors at the west. Scotch thrift, caution and immovability are national characteristics. Fully seven-eighths of the population are Presbyterians. The native tongue is Gaelic, but there are few who cannot also speak English.

Scotland has four universities: St. Andrews, founded in 1411; Glasgow, in 1450; Aberdeen, in 1494; and Edinburgh, in 1582. The last is visited by students from all over the world. Aside from these there are many technical schools and colleges. Elementary education is compulsory between the ages of five and fourteen.

Since 1894 Scotland has been governed by a Local Government Board of six members, all appointed by the English Crown. The secretary for Scotland is its president. A parish council for each parish, and municipal bodies for the cities, have charge of the local government. Scotland sends 72 members to the House of Commons and has 16 peers, elected for the duration of Parliament, in the House of Lords.

HISTORY. In spite of the walls built by Hadrian and Antoninus Pius, the Picts, the early inhabitants of Scotland, made frequent incursions into the southern, Romanized portion of the island. About the fourth century A. D. an Irish tribe called the Scots began to invade the country, and brought Christianity into Scotland. After generations of turmoil, Kenneth MacAlpine, King of the Scots, but also of Pictish descent, united the warring people in 843. From this time the country was called Scotland. It was about this time, also, that the Norse invasions began, and the people had to defend themselves from the Saxons on the south.

Malcolm II was the last descendant of Kenneth and was succeeded by Duncan, killed in 1040 by the usurper Macbeth, whose story was used in the great drama of Shakespeare. Duncan's son, Malcolm III, killed Macbeth in 1057. In 1066 Malcolm, who had married a Saxon princess, took the Saxon side against William the Conqueror and received many fugitive nobles into his kingdom. This brought him into collision with the Normans, and he died fighting against them in 1093. David, the youngest son of Malcolm, brought the country still more under English influences. He also drew the administration of justice under

the royal power; schools and a legislative assembly were established; and the towns were given a large share of self-government.

During the reign of Henry II Scotland was held as a fief for fifteen years, but Richard I sold back the power gained by his father. Alexander III was a child of eight when he became king. After a disturbed minority his later prosperous reign was cut short by his sudden death, which proved a great calamity for the country. The crown was disputed by several claimants, chief of whom were John Baliol and Robert Bruce. Edward I of England supported the claims of Baliol after the latter promised to do him homage for his help. Baliol was crowned king, but Edward made unjust demands which Baliol refused to obey. Edward took the King prisoner and placed the country under the rule of English nobles (1296). The people rose under William Wallace and, after his death, under Robert Bruce, grandson of the Robert Bruce mentioned above. Bruce defeated the English at the Battle of Bannockburn in 1314, and reigned as Robert I. In 1328 the independence of Scotland was formally acknowledged. Robert's son, David II, had to contend with Edward, son of John Baliol, who was supported in his claims to the Scottish throne by Edward III.

After Robert II, first of the Stuart kings, who died in 1390, the royal power was weakened by the long minority with which, for 200 years, each reign began. Added to the internal dissensions of the unruly nobles were the watchful kings of England and France, threatening the life of the kingdom. Robert III died in 1406, and his young son, James I, who had been captured by English cruisers while on his way to France for safety, remained a prisoner until 1424, when he regained his freedom and tried to put down the rebellious nobles and to advance the cause of the poor; but he was unscrupulous in the means he employed, and was murdered at Perth in 1437. After a troubled reign his son, James II, was killed in 1460.

James III added Shetland and the Orkney Islands to Scotland, and died fighting with the nobles in 1488. His son, James IV, married the daughter of Henry VII of England. He later turned to France as an ally, invaded England during the reign of Henry VIII, and was defeated and killed at the Battle of Flodden Field in 1513. His son, James V, then ten years old, freed himself from his jailers in 1528. He also allied himself with the French, remained true to the Catholic faith and died a few days after his defeat by the English, in 1542.

A few days before the death of James V his daughter Mary was born. Again a French alliance was sought during her long minority, and she was sent to France to be educated while the country was under the regency of her mother. In 1558 Mary was married to the Dauphin, afterward Francis II, but she returned to Scotland two years later after his death. By this time two distinct parties had grown up in England, the Reform Party, headed by her half brother, the Earl of Murray, and John Knox; and the Catholics under Huntly. Mary married her cousin, Darnley, a Catholic, in 1565, and thus lost the support of the Reform Party. Her hasty marriage with Bothwell shortly after Darnley's murder estranged her subjects, and she was forced to abdicate in favor of her infant son. She was defeated in an attempt to recover the throne, escaped to England, was kept a prisoner by Elizabeth for 19 years, and beheaded in 1587 (See MARY STUART). Her half brother, the Earl of Murray, was regent during the minority of her son, James VI of Scotland, who became James I of England upon the death of Elizabeth in 1603.

James I was succeeded by Charles I, who was executed in 1649 for trying to usurp the powers of Parliament (See CHARLES I). Charles II fled soon after his father's death, but was recalled in 1660, and ruled until his death in 1685. The short reign of his brother, James II, was filled with bitter religious dissensions. He was driven into exile by an exasperated country in 1688, and his

daughter Mary and her husband, William of Orange, were made sovereigns of England by act of Parliament. Queen Anne succeeded them in 1702, and during her reign, in 1706, the last Scottish Parliament drew up articles for a union of the Legislatures of England and Scotland. The chief provisions were that the united country should be called Great Britain; that the crown should pass to the Electress Sophia of Hanover or to her Protestant heirs; that the property rights and private rights of Scotland should not be changed; that there should be free intercourse and equal trade and citizen rights; and that the Established Presbyterian Church of Scotland should be maintained. This act was signed by Anne in 1707, and since that time the history of Scotland has merged into that of Great Britain. Population in 1911, 4,759,445.

Scott, *Skot,* **Duncan Campbell** (1862-), a Canadian poet, born in Ottawa, Ontario. He studied at Stanstead Wesleyan College, and after entering the Canadian civil service rose to the position of chief clerk and accountant in the department of Indian affairs. Among his works are *The Magic House, Labor and the Angel* and *New World Lyrics and Ballads.* He also published a collection of short stories of Canadian country life under the title of *The Village of Viger,* wrote *John Graves Simcoe* and edited the series entitled The Makers of Canada.

Scott, Robert Falcon (1868-1912), a British naval officer and Antarctic explorer, born in Outlands, Devonport. He entered the navy at the age of 14, and at 21 was lieutenant on the *Rover.* In 1889 he became lieutenant on the *Amphion,* and in 1898 and 1899 he was torpedo lieutenant of the *Majestic,* the flagship of the Channel Squadron. He was appointed first lieutenant in 1899, commander in 1900 and captain in 1904.

Captain Scott attained world-wide recognition as an Antarctic explorer. As commander of the British Antarctic Expedition in 1901 he discovered and named King Edward VII Land, established the existence of a range of mountains more than 1000 miles in extent, and discovered the fact that Antarctic ice is receding because of decrease of precipitation.

On June 1, 1910, Captain Scott left London in command of a second expedition in search of the South Pole. In the equipment for scientific research, in men, instruments and supplies, this expedition exceeded any others that had ever entered the polar regions. After establishing supply stations at frequent intervals and taking every possible precaution to safeguard their return, Captain Scott and four companions, Dr. E. A. Wilson, Lieut. H. R. Bowers, Capt. E. G. Oates and Petty Officer Edgar Evans, started on a forced march to the South Pole, which they reached on Jan. 18, 1912. Here they found the tent and flag left by Capt. Roald Amundsen, the Norwegian explorer who reached the pole Dec. 17, 1911. On the return march they encountered the severest hardships and began to suffer from lack of fuel and consequent proper nourishment. Encountering a severe blizzard, which made it impossible to proceed, the entire party perished within 11 miles of One Ton Depot, where supplies were awaiting them. Captain Scott's last message was dated March 25. Evans died Feb. 17, and Oates deliberately walked out of the tent to his death March 17.

No event in polar exploration since the loss of Sir John Franklin and his party in the expedition of 1845 has caused such a wide feeling of sympathy and admiration for heroic deeds as the death of Captain Scott and his ill-fated companions. A relief expedition discovered the remains of the party and sent the news of their fate to New Zealand by wireless telegraphy, where the message was received nearly a year after the tragedy. The character of the men and their high purpose are eloquently and simply described in Captain Scott's narrative found by his side.

"Writing is difficult, but for my own sake I do not regret this journey, which has shown that Englishmen can endure hardships, help one another, and meet death with as great fortitude as ever in

the past. We took risks. We knew we took them. Things have come out against us, and therefore we have no cause for complaint, but bow to the will of Providence, determined still to do our best until the last. These rough notes and our dead bodies must tell the tale, but surely, surely, a great rich country like ours will see that those who are dependent on us are properly provided for."

See POLAR EXPLORATIONS, subhead *Antarctic Regions;* AMUNDSEN, ROALD.

Scott, Sir Walter (1771-1832), a Scottish poet and novelist, born in Edinburgh. He prided himself on his descent from ancient Border families of good blood; during his childhood he learned by word of mouth to know the history of his country, as well as the legends and traditions of the heroic past, with which the Border teemed. A fever in his early childhood brought about a lameness which for a long time interfered with his pleasure and activity. In 1783 he went to the University of Edinburgh, where he neglected his opportunities for formal study, but read widely, adding unconsciously to his store of knowledge of the remote past upon which he would come to draw with such happy success later in life. He was called to the bar in 1792, and seven years later was appointed sheriff-deputy of Selkirkshire. In 1806 he was given the office of clerk of session, the duties of which he continued to discharge faithfully for 25 years. During this time he had begun to write poetry, and his reputation was soon secured, through the efforts of his leisure hours. In 1802-03 he published the three volumes of his *Border Minstrelsy.* There was a freshness and novelty about his work which did not wane until after he had published *The Lay of the Last Minstrel, Marmion, The Lady of the Lake, The Vision of Don Roderick* and other poems. Then, as he himself expresses it, Byron eclipsed him in poetry and Scott turned to prose.

When Scott's *Waverley* novels began to appear an admiring public soon realized that he had found his true bent and his most natural vehicle of expression. He published his novels anonymously at first, feeling that it was beneath his dignity as a clerk of the Court of Session to dabble in fiction. By 1820 he was at the height of his fame, having written some of the most enduring of his splendid historical romances. He lived at Abbotsford, mingled so freely in society and performed his official duties so conscientiously, that his friends were nonplused when they discovered the great amount of writing he found time to do at odd moments and during the early morning hours. He grew lax and careless at times, but next to the achievement of Trollope (whom he surpassed in accuracy) his rate of production is perhaps unrivaled in the history of literature. Then the strain of his brilliant and prosperous labors began to tell on his health, and by 1817 he suffered intermittently from illness, which, however, in no wise checked his prodigious activity. In 1826 came the financial reverse —the failure of the publishing house of Ballantyne & Co. with which he was connected—that made him bankrupt and darkened the last years of his life. He was too proud to ask assistance and began to write, against time and ill health, in order that his debts might be wholly cleared. With greater speed even than during his best days, he worked feverishly until paralysis overtook him and cut short a life distinguished by a heroism as nobly sad as the world has ever seen.

Scott was the creator of the historical novel, which after his day had great vogue. He delineates Scottish character, at least in its humbler aspects, with skill and competency. Working on broad lines, he seldom attained the subtle, and at times his scenes and characters are overdrawn, romantic and ideal, but his diverting panorama of action and scenes from the past has been attempted on a scale almost unequaled in its range, and the influence of his touch on subsequent work has been enduring. He wrote critical prose of merit, but interest in that and in his poetry flags before his novels,

among which are *Waverley, Guy Mannering, The Antiquary, Old Mortality, The Black Dwarf, Rob Roy, The Heart of Midlothian, Bride of Lammermoor, The Legend of Montrose, Ivanhoe, The Monastery, Kenilworth, The Talisman, Quentin Durward* and *Woodstock.*

Scott, Winfield (1786-1866), an American soldier, born near Petersburg, Va. He was educated at William and Mary College and was admitted to the bar, but joined the army at the age of 22. Early in the War of 1812 he was captured at Queenstown Heights, being released, however, and later serving in the Battle of Chippewa and of Lundy's Lane, where he was severely wounded. He subsequently commanded at Charleston during the nullification disturbance, operated against the Seminoles and Creeks and, in 1841, was appointed commander-in-chief of the United States army. But Scott is famed chiefly for his brilliant conduct during the Mexican War, in which he besieged and took Vera Cruz, stormed Cerro Gordo, won victories at Contreras, Churubusco, Molino del Rey and Chapultepec, and finally captured the City of Mexico, Sept. 14, 1847. He was twice defeated for the presidency, and served on a commission to rectify the boundary line with Great Britain. At the outbreak of the Civil War, though still in command of the army, he retired because of his advanced age in October, 1861. In 1864 he published his autobiography. Because of his impressive bearing, strict discipline and adherence to military formality, Scott won the sobriquet of "Old Fuss and Feathers."

Scout, *Skout,* the lookout ship of a war fleet. A scout is a vessel of great speed, equipped for long cruises without stopping for supplies. She is the "eye of the fleet." A scout is not in any sense a fighting ship, her particular duty being to keep the whereabouts of the enemy reported to the commander of her own fleet, and to guard against unexpected attacks. See FRIGATE.

Scranton, *Skran' tun,* **Pa.,** a city and county seat of Lackawanna Co., 167 m. n. of Philadelphia and 134 m. w. of New York, on the Lackawanna River at the mouth of Roaring Brook and on the Delaware, Lackawanna & Western, the New York, Ontario & Western, the Delaware & Hudson, the Central Railroad of New Jersey, the Wyoming Division of the Erie and other railroads. The Lackawanna & Wyoming, or Laurel Line, operated by electricity, connects the city with the many thickly populated towns and cities of the Lackawanna and Wyoming valleys. Scranton is situated in the center of the largest anthracite district in the United States and contains many large collieries within its limits. The city occupies an area of over 20 sq. m. on both sides of the Lackawanna River. The elevation of the different parts of the city varies from 800 ft. to 1800 ft. above sea level.

PARKS AND BOULEVARDS. The city contains many miles of well-paved streets and avenues, and the residential districts are especially attractive with lawns and gardens. There are a number of parks, Nay Aug Park being the largest.

PUBLIC BUILDINGS. Among the most notable public buildings are the post office, courthouse, municipal building, 13th Regiment Armory, Board of Trade Building, Y. M. C. A. and Y. W. C. A. buildings, Masonic Temple, Connell Building, and many costly school buildings and churches. Scranton is the seat of a Catholic see.

INSTITUTIONS. The educational institutions include the Central High School, International Correspondence Schools, Oral School for the Deaf and Dumb, Mount St. Mary's School for Girls, many public and parish schools, and the W. T. Smith (Memorial) Manual Training School and Albright Memorial Library. The city also contains an Institute of History and Science and the Everhart Museum of Natural History, founded and endowed by Dr. I. F. Everhart of Scranton. There is a soldiers' and sailors' monument and monuments to the memory of Columbus and Washington. Other institutions include the Moses Taylor, Lackawanna and two gen-

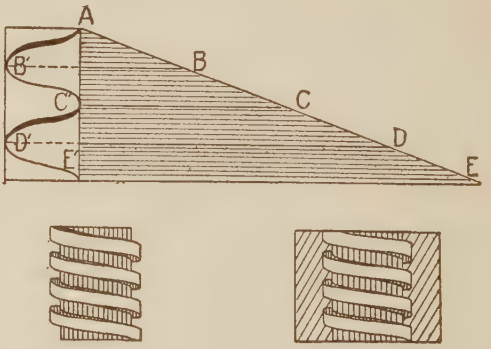
eral hospitals, Burns Private Hospital and a Home for the Friendless.

Industries. Scranton is an important distributing point for general supplies throughout the Lackawanna mining region, and the annual output of anthracite within the county amounts to about 20,000,000 tons annually, which is worth at the mouth of the mines, $54,000,000. Among the manufacturing industries are large furnace works, steel works, silk mills, lace curtain mills, iron foundries, knitting mills, locomotive and stationary-engine works, and manufactories of steam boilers, edge tools, mining machinery, leather, nuts and bolts, sash and blinds, axles and springs, stoves, scales, screens, grates, railway spikes, pianos, pumps, buttons and car wheels.

History. The first settlement was made in 1788 on the Roaring Brook, which is now included in the city. In 1799 the place was called "Slocum Hollow" after the Slocum family, who were among the most prominent settlers. The city was founded in 1840 by Joseph H. and George W. Scranton and the town named in honor of the latter. Scranton was incorporated as a borough in 1854 and chartered as a city of the third class in 1866. A second-class city charter was granted in 1901. Population in 1920, U. S. census, 137,783.

Screw, in mechanics, a cylinder having about it a spiral ridge, or elevation, which cuts all the elements of the cylinder at the same angle. A hollow cylinder having a similar spiral groove into which the elevation fits is called the nut. The spiral ridge is called the thread, and according as its edge is square or sharp is known as a square or sharp screw. The vertical distance between two whorls of the thread is known as the pitch, and the angle which the thread makes with the base of the cylinder is known as its inclination. The screw is a modified form of the inclined plane, as will be seen if a right triangle cut from paper, representing the inclined plane, is applied to a cylinder so that its altitude follows the axis and its base is wrapped about the lower circumference. The hypotenuse of the right triangle will form the thread of the screw. This can easily be shown by winding the triangle around a pencil.

The common screw is a right-hand screw, that is, the thread passes from left, over to right. The left-hand screw has its thread cut in the reverse manner; it is used only in special instances, as the left-hand end of carriage axles, where the turning of the wheels would otherwise tend to turn the nut from the axle. Power is generally applied to the screw by means of a lever, as in a binding press. The law of the screw is stated thus: the power applied to turn the screw is to the resistance against advancing the screw, as the pitch of the screw is to the circumference of the circle through which the power acts. In practice, friction makes it necessary to apply a considerably greater power than that calculated by this rule. The mechanical advantage gained by the use of the screw is very great, and screws are widely used in all classes of machines and in construction work. In an endless screw the thread moves between the teeth of a wheel and causes it to revolve.



SCREW

A, B, C, D, E, show the points on the inclined plane that correspond respectively to the threads A, B', C', D', E'. In the lower cut the thread and interval are shown.

Such arrangements are used in elevators and other places where very heavy weights are to be raised slowly by means of small motors. The motor turns the endless screw and the weight is raised

by a rope wound around the axle of the wheel. Such a device will not "run down" should the power applied to turn the screw suddenly fail. See INCLINED PLANE; LEVER; WHEEL AND AXLE.

Screw Pine, a scrubby, stunted member of the Pine Family found near the coast where exposure to the ocean winds has hindered its growth. In America it grows from Alaska south through California, and the dense thickets form a windbreak beneath which more delicate plants find shelter. Its twisted branches are in demand for rustic porch furniture, and the Indians use the soft, juicy wood in preparation of a kind of hard cake which is said to be nourishing though not wholly pleasing to a more cultivated taste. The dark green leaves are in whorls of two or three and are long. Screw pine is variously called scrub pine and twisted pine. The screw pine of Polynesia is a palmlike plant having roots extending from the stem so far above the ground that the plant seems to grow upon stilts. Its fibers are used in the manufacture of cordage.

Screw Propel'ler, a device somewhat in the form of a screw, which, being fitted to a shaft in a ship, when revolved propels it through the water. It usually consists of two or more blades forming portions of two, three or four threads of a screw arranged around an axis. The usual position for the propeller, when there is only one, is immediately before the stern post, the shaft passing parallel to the keel into the engine room. When two propellers are employed they are set on each side of the keel, and are termed twin screw propellers. John Ericsson, a Swedish engineer, is given the credit for the invention and practical development of the screw propeller, but many designs showing great improvements on his patterns are now in use. They are employed on motor boats the size of skiffs, driven by gasoline engines, and also by the 800-foot ocean liners employing steam turbine engines. See STEAMSHIP; ERICSSON, JOHN.

Scribe, *Skribe,* the name applied to one of a class of men in the Jewish Church who were learned in the law. In early times it had a somewhat different application, being used to designate Ezra, who was both a priest and theologian. In New Testament times the scribes were interpreters and teachers of the law, not priests. The majority of them were Pharisees, but they are mentioned separately in the New Testament, as they were the learned leaders of this party, and established a definite intellectual caste. After the fall of the Jewish state the scribes became the sole authority in the Church.

Scrofula, *Skrof' ụla,* an infection accompanying a tuberculous condition and believed to be due to infection of the tuberculosis bacillus. It is manifested by the formation of tubercles in the lymphatic glands and other parts of the body, which develop into ulcers, more often at the side of the neck. The general breaking down of the tissues often leads to tuberculosis. A tendency to the disease is hereditary in some cases. In the Middle Ages scrofula was known as king's evil, and was believed to be curable with the king's touch.

Scud'der, Horace Elisha (1838-1902), an American author and editor, born in Boston, Mass. After graduating at Williams College in 1858 he taught school in New York City and later devoted himself entirely to literary work. He was made editor of the *Riverside Magazine for Young People* in 1867, and in 1890 he became editor of the *Atlantic Monthly.* His work as an editor and critic was sane and discriminating, and was surpassed in excellence by his juvenile fiction alone. He was editor of the American Commonwealths Series and with Mrs. Bayard Taylor published *Life and Letters of Bayard Taylor.* His life of James Russell Lowell touched sympathetically on all the important matters relating to the poet's life and work, and presented also an accurate picture of the age. His books for children are *Seven Little People and Their Friends* and the *Bodley Books,* in eight volumes. He also published *Life and*

Letters of David Coit Scudder, Stories from My Attic, Stories and Romances, Noah Webster, A History of the United States, Men and Letters, George Washington and *Childhood in Literature and Art.*

Sculpin, *Skul' pin,* a family of Northern fish, found in deep waters or coastal rivers only as far south as Virginia, California and Japan. The different species vary greatly in form and habits, but are distinguished by their numerous vertebræ, spiny fins and deteriorated scales. The flesh of all species is coarse and tough and of little value as food. Many fish of this family have long spines upon the side of the head, which may be erected to so wide an extent that they are protected from the voracity of other fish. Local names applied to the sculpins are the Irish lord, miller's thumb and sea raven.

Sculpture, *Skulp' ture,* a general term signifying the art of fashioning figures, ornaments or groups from plastic or hard materials. It is not limited in application to work in marble and stone, but includes that done in wood, ivory, metal or gems, or any material from which solid works of art may be produced. The subjects and arrangements in sculpture are as varied as are the materials. The principal ways of modeling are: figures *in the round,* that is, standing free; figures *in relief,* that is, with the object resting on a solid background from which it projects with varying elevation; *intaglio,* showing the shape of the figure hollowed out of the material—usually gems; and *intaglio-relievo,* in which the figure is modeled convexly in a concave surface. The Egyptians frequently used this form of modeling. Of all existing forms, the human figure is preeminently suitable for sculpture.

The processes of sculpturing are varied. Before executing a work in marble the sculptor usually models his figure on a small scale in wax or clay. If the statue is to be of large size, he then has an iron frame made, upon which he builds modeling clay, reproducing the miniature preliminary sketch to the size which the finished statue is to be. The full-sized model being completed, a plaster cast is made of it and set up to be copied in marble. Until recent times the sculptor went to work with mallet and chisel and hewed out his statue from the stone block, sometimes with the aid of skilled pupils; today this practice is rarely, if ever, employed. The marble cutting is now done mechanically by a practical stone cutter. The model and the marble block to be carved are placed upon adjacent pedestals, and, with the aid of a device called a "pointing machine," holes are drilled into the marble to the same depth as the depression upon the surface of the model. With the help of these holes the stone cutter cuts away the marble until he reaches the bottom of the holes. The work is then taken in hand and finished by a more skilled stone cutter or by the artist himself. Michelangelo is said to have cut his marble without previously having prepared his model—an almost incredible feat of skill. The modern sculptor has another mechanical device for use in the production of bas-relief. The design is sketched upon a slab of slate, and the clay is then modeled upon it; thus the entire relief is kept true to one plane. Greek reliefs had no fixed plane; the tendency there seems to have been rather a working from a front plane into a background of varying depth.

Bronze is the most satisfactory material for sculptural works on a large scale. In working in it, a plaster cast is made of the clay or wax model, and the bronze is cast in the mold, later to be corrected in detail by the sculptor with his chisel. Iron has been also used in this way, but owing to its hardness, such a statue cannot be retouched by the sculptor, and the mold must be unusually accurate.

HISTORY. Two great schools of sculpture flourished before the golden age of Greek art, that of Egypt and that of Chaldea. It has been said that the sculpture of Egypt expressed the idea of permanence and that of Chaldea the

idea of strength. Later the Greeks realized the ideal of beauty.

Egypt. The sculpture of Egypt is chiefly connected with the temples and the tombs. The earliest of these are illustrative of the manners and customs of the people; some pictured historical events, and some mythological conceptions; others were little more than hieroglyphics. Portrait statues of the deceased were also made, in the belief that the spirits of the departed would occupy them indefinitely. The statues were sometimes in groups, but more often occurred singly, and were of colossal size; those of the underground temple-tombs of Abu-Simbel range from 60 to 90 ft. in height. The only sculptural type originated by the Egyptians was the imperishable sphinx, with the body of a lion and a human head, suggesting the ideal union of human intellect and superhuman strength. All statues were painted, unless carved out of colored material. The thousands of pieces of Egyptian sculpture that have come down to us are all marked with the same characteristics: a high degree of technical skill and an absolute observance of tradition. Egyptian artists could carve a good portrait out of the hardest material with the rudest tools, but they lacked constructive imagination to invent new forms; thus the figures are all in much the same position and of the same form. Notwithstanding, the sculpture of Egypt is marked by a grandeur and an impressiveness not found in the art of any other age or country.

Chaldea. The sculpture of the Tigris-Euphrates Valley has left few examples, though it included the art of Babylonia, Assyria, Persia and Phœnicia. The Chaldeans were not rich in native materials and their art consequently was not developed as in the Nile, though its influence was wider. The chief monuments are bas-reliefs from the walls of the palaces. They depict chiefly the victories of the king, but occasionally the gods appear, as in the familiar Assyrian bas-relief of the winged bull with the human head. The figures are sturdier and more robust than in Egypt, and the chief idea seems to be the glorification of brute force. The representation of animals is the triumph of Chaldean sculpture.

Greece. The progress of the Greeks in the domain of art was extraordinarily rapid, and it early reached perfection. The earliest examples of Greek sculpture show Oriental tendencies, but the Greeks, with their appreciation of the beautiful and rationalistic attitude toward life, rapidly outdistanced their predecessors. The existing works of Greek sculpture are of one of two classes: statues made for their own sake; and decorative sculptures for public buildings, intended to be subordinate to architectural effect. The chief figures are gods and goddesses and human heroes, though it is often difficult to distinguish which is which, inasmuch as the Greek idealized men and represented divinities as human beings of surpassing beauty. The themes of Greek sculpture were of all phases of life, religious, civic, domestic or sepulchral, according to demand. Historical sculpture was almost unknown, but events of importance were commemorated by mytho-poetical monuments, and in the temples the whole range of Greek mythology may be found.

The formative period of Greek sculpture lasted until the end of the Persian Wars (about 480 B. C.). After this came a tremendous outburst of Greek genius, as manifested in literature, art and philosophy. The first works which foreshadow the perfection of Greek sculpture are the groups representing the combats between the Greeks and Trojans, which belong to a period between 400 and 460 B. C. These works have a certain rudeness, but are simple and vigorous, and show a growing mastery of form as well as an advance in depicting facial expression and bodily movement, and in the harmonious groupings of figures, the last, one of the greatest innovations in the history of art. The latter half of the fifth century B. C. was the period of the noblest art of Greece. The demand for statues of victorious athletes

gave impetus to sculpture and led to a close study of the nude. One of the most famous of these statues, and one which shows an almost complete emancipation from archaic tradition as to pose, is the *Discobolus of* Myron, representing the athlete in action. *Marsyas,* another well-known nude, is attributed to the same source. Both are preserved to us in copies at Rome. Polyclitus, who was the first to make his statues stand "with one foot free," originated a type of Amazon of great beauty and charm; his spear bearer, called *Doryphorus,* was long regarded as the model of bodily proportions.

Greek sculpture culminated in Phidias, whose ivory and gold statues of Athene in the Parthenon and of Zeus at Olympia were regarded by contemporaries as the noblest masterpieces of antiquity. None of his works survives, and posterity must judge of his genius by the comments of contemporary writers, by the imperfect copies made by his followers and by the few remaining imperishable works executed under his supervision. The decorations that were once on pediments, frieze and metopes of the temple now form the famous collection of the British Museum, known as the Elgin Marbles (See ELGIN MARBLES). Another masterpiece sometimes attributed to Phidias is the incomparable *Venus of Melos,* perhaps the most famous statue in existence. See PHIDIAS.

Following in the wake of this period of noble conceptions, serene formal beauty and self-restraint, a reflective art arose which sought to express not merely the perfection of the physical but the spiritual as well. The most illustrious exponents were Praxiteles and Scopas. The *Hermes* of Praxiteles is almost the only existing marble statue that can be assigned without doubt to one of the great sculptors. Others of his works are preserved in copies. Several works of Scopas which have been identified show him to be an original genius who introduced expressions of suffering and passion into his faces. Lysippus, another great sculptor of the fourth century, survives for us only in copies, most celebrated among which is the *Apoxyomeños* of the Vatican. At this time artists began to delight in a variety of vigorous and lively movements, in whirling draperies and other accessories that added naturalism. A notable example of this tendency is the *Victory of Samothrace,* a beautiful expression of movement, ascribed also to Lysippus. See PRAXITELES; LYSIPPUS.

After the death of Alexander art no longer centered at Athens, but became widely diffused throughout the Mediterranean countries; this art was realistic and excelled in expression of vivid emotions. To it belong: the *Dying Gaul,* in the museum of the Capitol, Rome; the over-praised Laocoön group; and the *Farnese Bull.* The *Apollo Belvedere,* though of different character, also belongs to this period.

Rome. The Romans developed a distinctly national art under the late republic and the empire, although when Greece became a Roman province Greek statuary was carried to Rome and Grecian sculptors flocked thither. In spite of the imitative tendency, some excellent original works were produced; the historic bas-reliefs of commemorative arches and buildings, and the realistic portrait statues, notably that of Augustus, are characteristic of the age. About the middle of the second century of the Christian Era Roman sculpture began to deteriorate, and was followed by the lifeless symbolic art of the early Christians who condemned sculpture as idolatrous. It then came to be used solely for the decoration of buildings and was strictly subordinate to architectural effect. In the 12th to the 15th centuries, the Gothic period, sculpture again showed signs of an independent existence and small recumbent statues appeared on tombs; statuettes and bas-relief in wood and ivory also became common.

The Renaissance in Italy. The center of the revival, however, was Italy, where during the 13th century the renewed activity derived its inspiration from the study of nature and the antique. The

—Nellie Walker.

"How beautiful is youth! how bright it gleams
With its illusions, aspirations, dreams."

first work of importance was the pulpit of the Baptistery at Pisa, carved in 1260 by Niccola Pisano, which, though Gothic in form, is antique in spirit. It was followed by the works of Giovanni and Andrea Pisano, and of Andrea Orcagna; the last was a painter and an architect, as well as a sculptor, and his masterpiece is the shrine of Or San Michele, Florence. Jacopo della Quercia, a powerful and original sculptor, marks the transition from the Middle Ages to the Renaissance. The first master of the new order was Lorenzo Ghiberti, famous for the bronze doors of the Baptistery at Florence; these were decorated with scriptural bas-relief, and were an inspiration to his Florentine followers. One of the greatest sculptors of all ages, Donatello, also lived in this period; he produced a series of masterpieces, which, for rhythm and proportion and architectural adaptation, are scarcely matched save by the great works of Greece. Donatello's work dominated Italian sculpture until the time of Michelangelo, and among his contemporaries and followers was Andrea del Verrocchio, whose work shows a fine feeling for beauty. See ORCAGNA, ANDREA; GHIBERTI, LORENZO; DONATELLO; MICHELANGELO BUONARROTI; VERROCCHIO, ANDREA DEL.

The High Renaissance. In Italy, sculpture, like painting, existed not as a national art, but in a number of methods of expression, centering about the art cities. The Sienese School was sentimental in its tone; in Padua the style was vigorous, but abounded in decorative detail; in Venice sculpture and architecture were closely united. The Florentine, however, was the great school of Italian sculpture, and its influence was felt not only throughout Italy but also throughout Europe. Here, especially in the 16th century, sculpture was released from its union with architecture, and statues of colossal size were introduced. Among the many prominent names of this period and school are those of Andrea del Sarto and Leonardo da Vinci, both of whom were gifted in many lines of art.

SCULPTURE

Above them all in the art of sculpture stands the name Michelangelo, who united with his technical skill an exact knowledge of anatomy, a marvelous spiritual insight and an unsurpassed sense of beauty and harmony. He pictured the human form in dramatic action and caused it to express all types of emotion. Naturally, but unfortunately, Michelangelo's disciples, unable to achieve his heights, became merely imitators, copying chiefly his faults and lacking the genius to catch his higher art. See SARTO, ANDREA DEL; VINCI, LEONARDO DA.

Through the patronage of Francis I, many of the Florentine artists were induced to visit France, which became another center, though it was chiefly Florentine in tone and long without any native art. Pierre Bontemps was the first sculptor of a French School. His work and that of Goujon, noted for his portrayal of the female figure, show a strong naturalism that is wholly French, though its grace and beauty are due to Italian influence. Through the succeeding years, and especially in the time of Louis XIV, sculpture became exaggerated in decorative detail until a school arose whose self-restraint and graceful work introduces the 18th century. In it sculpture began to express a delicate sentiment hitherto unknown in French art, and portraiture became strikingly realistic. The names of the century include Lemoyne, Bouchardon, Pajou, Pigalle and Clodion, but all that was best in the work of the age culminated in Jean Houdon, the greatest portrait sculptor of France. See GOUJON, JEAN; HOUDON, JEAN ANTOINE.

Germany freed itself slowly from Gothic traditions. Its most important school of sculpture was the Franconian, centering at Nuremberg. Its first exponent was Wohlgemuth, whose work is characterized by earnestness and naturalism. Adam Kraft, the celebrated stone cutter, and Peter Vischer, the chief bronze founder of the German Renaissance, were among the gifted workers. Elsewhere the Renaissance was marked

by the work of the Dutchman, Claux Slüter; the Belgian, François Duquesnoy; and the Spaniard Montañez and his pupils. The sculpture of England was almost wholly an imported art, the only conspicuous native names being those of Nicholas Stone and Grinling Gibbons.

Modern Sculpture. A modern revival of classical sculpture began in Italy with Canova, an artist who cared more for sentimentality than for strength. Of like merit is Thorwaldsen, the leading Scandinavian representative of the classic in modern art. In France a reaction appeared with David d'Angers, whose work is a transition to modern realism. In that country, too, is found the leading school of modern sculpture. Antoine Barye, the great sculptor of animals, is prominent in the naturalistic movement. Among later artists who have drawn inspiration from the Renaissance are Paul Dubois; Bartholdi, sculptor of the *Statue of Liberty* in New York Harbor; and Saint Marceaux. In the last quarter of the 19th century sculpture of the highest order has been executed in France. The leading representative of this period is Auguste Rodin, an original genius with a keen sense of the significant and a high scorn of tradition. In England the reaction from Classicism came with Alfred Stevens, who was followed by Foley, Boehm and Woolner. Notable works were also produced by G. F. Watts, Sir Frederick Leighton, Armstead, Thornycroft and Ford. The most influential English sculptor today is Alfred Gilbert, gifted with poetic imagination and refined taste. Prominent among the fellow workers are Harry Bates, Robert Stark, John Swan and Frederick Pomeroy. See RODIN, AUGUSTE; FOLEY, JOHN HENRY; LEIGHTON; SIR FREDERICK; WATTS, GEORGE FREDERICK.

The classical revival in Germany was ushered in by Johann Dannecker, the founder of the Stuttgart School. Historical sculpture of a modified classical style is seen in the work of Johann Schadow, his son Rudolph and Christian Rauch. The transition to the Romantic treatment began near the opening of the 19th century, and the new art was fully established in the work of Reinhold Begas, justly celebrated for his famous memorial to William I. The Scandinavian Peninsula has furnished many sculptors of undoubted genius; those working at present are the Norwegian, Sinding, and the Swedish artists, Edstrom, Milles and Eldh. Russian sculpture, which is of comparatively recent origin, is marked by a strong naturalism and a firm characterization. Prince Paul Troubetzkoi, who has executed numerous small animal pieces, chiefly in bronze, and some strikingly individualized portraits, and Naoum Aronson, a versatile genius, whose art is distinctively national, are among Russia's leading representatives. Aronson's heads of children are among the most exquisite creations of present-day sculpture. See RAUCH, CHRISTIAN DANIEL.

Among the earliest names in American sculpture are those of William Rush, a carver of portraits and of figureheads for ships, and John Frazer, a stone cutter, both self-taught. Horatio Greenough, the first American to study in Europe, left a number of well-executed busts. Many names are of importance in the development of American art whose work is not especially well known outside of this country; among these should be mentioned Hiram Powers, William Wetmore Story and Harriet Hosmer. A national spirit in the art gradually appeared chiefly through the work of Henry K. Brown and J. Q. A. Ward. As in all modern sculpture, the French has been the dominant influence, so it has been a large factor in American art. The first American sculptor equipped with French training was Augustus Saint Gaudens, the author of a series of noble monuments. His two distinguished contemporaries, Daniel Chester French, all of whose pieces show unerring taste and refinement of workmanship, and Frederick MacMonnies, a master of a powerfully realistic style, have made invaluable gifts to their country's

SEA-ANEMONES

art. A few who have dealt in national themes, as the Indians and the animals of the Western plains, are: Edward Kemeys, Edward Potter, Frederic Remington and Solon H. Borglum, the last of whom will be ranked among the first, if not the first, of American sculptors. Foremost among the other sculptors working in various parts of the country are William Partridge, an artist of great technical skill and gifts of composition; Herbert Adams, who made several charming busts; C. H. Niehaus, distinguished for delicate workmanship; and Lorado Taft, a leading spirit in municipal art movements in Chicago, and a well-known teacher and lecturer. Among America's successful women sculptors are Anna Hyatt, Katherine Cohen, Helen Mears and Julia Bracken Wendt. See STORY, WILLIAM WETMORE; HOSMER, HARRIET GOODHUE; BROWN, HENRY KIRKE; WARD, JOHN QUINCY ADAMS; SAINT GAUDENS, AUGUSTUS; FRENCH, DANIEL CHESTER; MACMONNIES, FREDERICK WILLIAM; REMINGTON, FREDERIC; PARTRIDGE, WILLIAM ORDWAY; NIEHAUS, CHARLES HENRY; TAFT, LORADO.

Scurvy, *Skur' vy,* a disease characterized by general weakness, swelling and bleeding of the gums and purple spots on the skin, which sometimes develop into ulcers. In malignant types the patient bleeds at the nose and vomits blood. The disease is caused by monotonous diet, usually salt meats. It is of rare occurrence at the present time, but was formerly prevalent in merchant marines and navies, where sailors were forced during long journeys to live exclusively upon salt fish, hard bread and impure water. Deaths resulting from it were numerous. Fresh fruits and vegetables are the best treatment, as well as the best preventive of the malady.

Scutari, *Skoo' tah ree.* See SKUTARI.

Scylla, *Sil' a,* in classic mythology, the beautiful maid whom Circe turned into a six-headed sea monster. See CHARYBDIS; GLAUCUS.

Scythe, *Sithe,* an implement used for cutting grass, weeds, etc. It consists of a long, curving blade, sharpened on its concave, or inner, side, attached at one end to a long, crooked handle having two short cross handles, and called a snath. It is operated by being swung around in a semicircle. Sometimes the long handle is provided with a framework of wooden bars, or fingers, and it is then called a cradle, and is used for cutting grain, chiefly on small farms where there are no reaping machines. See MOWING MACHINE; REAPING MACHINE.

Sea. See OCEAN.

Sea Anem'one, a group of polyps which have received their name because of their resemblance to a flower. These curious animals are often brightly colored and generally remain temporarily attached to some rock by means of a flat disk at the base of the thick, stalklike body. At the upper extremity is a large mouth surrounded by several rows of tentacles which are variously specialized. Some of them carry tiny, threadlike barbs which may be extruded, and serve to wound any animal that will serve as food; other tentacles then seize it and draw it into the central mouth. A few of the tentacles are thought to bear the special sense organs. Sea anemones reproduce by eggs or by budding; in the latter method protuberances extend from the stalk near the base and in time break off to form new individuals. Although sea anemones do not move frequently, they are capable of quite extended journeys by contraction and expansion of the flattened disk.

Sea Bass, a family containing nearly 400 species of carnivorous, marine fishes, frequently seen ascending large, coastal rivers or inhabiting warm seas. They are recognized by the presence of 24 vertebræ and by the three spines of the anal fin. The different species vary greatly in form and size, but have the compressed body, elevated back and clean build of all bass. They haunt the rocky ledges of bays and river mouths and there feed upon Mollusks and tender seaweeds. They are slow, clumsy fish, rarely found at the surface. The average weight of the sea bass is two and one-half pounds, though much

larger ones are caught in the Pacific. The flesh is white, flaky and of pleasing flavor; it is a favorite food fish in many localities, especially in Japan. It is interesting to note that this is the first sea fish which the United States Fish Commission attempted to propagate artificially. The name sea bass is wrongly applied to a great number of other species of fish of widely differing families.

Sea Cow. See MANATEE.

Sea Cu'cumber, a large group of tough-skinned animals, whose name sufficiently indicates their shape. They vary in size from the great sea cucumber, which is a foot in length, to smaller varieties of less fleshy form. The skin is kept moist by means of a secretion of mucus which renders it both leathery and elastic. At one end of the body there extends a cluster of branches or spiny tentacles by which food is passed to the encircled mouth. Along the sides of the body there are frequently found rows of spines or suckers that probably aid locomotion. Sea cucumbers live in warm seas where there is soft mud and plenty of seaweed. They are found in abundance in the East Indies, and a species known as trepang is there sun-dried and sold to the Chinese for making soups.

Sea Hare, a family of marine Mollusca of the group known as Gasteropoda. Members of this family are frequently brilliantly colored, although their prevailing shade is green. The head has two pairs of eyes and the gills are featherlike. The shell, which is entirely concealed within the body, is thin and flexible when first removed, and is coated with a horny layer of skin. Sea hares live in muddy bottoms, from which they emerge in search of their prey; if pursued, they squirt out a violet-colored liquid, which darkens the water and covers their retreat.

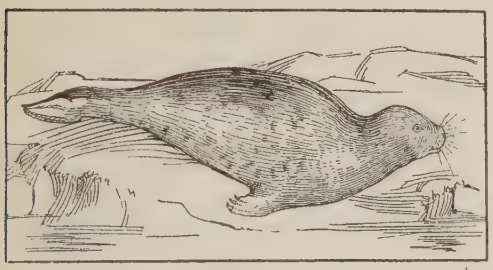
Sea Horse, or **Hip"pocam'pus,** a peculiar fish of the Sea Horse Family. The common name refers to the horselike head with its protruding snout, elevated cranium and large eyes. As fish they defy all laws of form and habit except that they are aquatic and gill-breathing. The bodies of sea horses are plump, and have small ventral fins and larger, spreading dorsal ones. Their tails are long and tightly coiled; by means of these they cling, head down, to a bit of eelgrass or seaweed, and are carried about with it, thus being provided with their chief means of locomotion. The male has an egg pouch beneath the abdomen, in which he places the eggs as soon as they are deposited, and there the young are hatched. This curious little fish is found in all warm regions, and various species are peculiar to Japan, southern California, Florida and the East Indies.

The pipefish is a member of the same family and has many of the same curious points of structure. Were the head of the sea horse unbent, so that it would lie on a straight line with the body, and were its tail uncurled and terminated by a fanlike fin, the two species would be practically alike. Its habits are the same as those of the sea horse, and it is found in the same localities.

Seal, *Seel,* a stamp bearing device or inscription which, when placed on a document, gives that document a legal standing. The seal was used long before the art of writing was generally practiced, and took the place of the signature. Each ruler had a device on his seal which could be used by him alone. The device was frequently engraved on a precious stone which was mounted in a ring, and this constituted the monarch's signet ring. Mounted in this form the seal was always at hand when needed. The impression was made in some plastic substance on fine clay or wax. Each state has a seal with its device, and this is stamped upon state documents. The seal of the United States is used in a similar manner (See UNITED STATES, GREAT SEAL OF). A notary public is required to stamp his seal upon deeds and other documents which he witnesses.

Seal, a large family of Mammals, which by a curious arrangement of limbs are fitted for life upon land or in the

water, though they are chiefly aquatic. Their toes are united by stout webs, but bear strong claws, which indicate the presence of the five phalanges. The bones of both fore and hind limbs are mostly concealed within the body, and in consequence the external limb is short. The hind limbs are the chief means of locomotion and are located at the extremity of the body, lying almost parallel to the tail. Their bodies are cylindrical and tapering, with scarcely any neck, and with a small round head. Underneath the skin is a layer of blubber, which serves to maintain an even temperature as the seal moves from land to water; it also lowers the specific gravity and enables the seal to swim with greater ease. The coating of the body is a soft,



SEAL

silky fur interspersed with longer, smooth hairs, which, lying close to the body, do not impede motion in the water.

Seals live in the seas near coasts where fish abound and where they may bask in the sun. All are playful animals, rarely ferocious, but generally timid, taking to the water upon the slightest disturbance. Well-known genera of seals are the sea lions, true seals, hooded seals, so called from their cartilaginous crest, sea bears and walruses. Seals are intelligent and are easily trained to performances in the circus ring. See SEA LION; WALRUS; FUR SEAL; ELEPHANT SEAL.

Sea Lem'on, a remarkable jellyfish having an oval body, shaped much like a lemon. It is noted especially for its clear transparency, and can be seen in the water only when the tiny hairs, which are constantly in motion, receive the light at a certain angle. The sea lemon is a free-swimming marine animal and is found in tropical waters, where it is frequently cast upon shore in a shapeless mass by the tide.

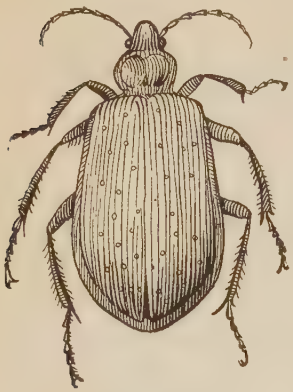
Seal'ing Wax, a resinous composition resembling wax, employed for sealing envelopes and packages, and designed to protect them by receiving the private seal of the sender. It was formerly made of beeswax and turpentine. The best sealing wax is now made from shellac, melted with rosin, to which is added turpentine and coloring matter. It is made in sticks, which, when used, are set on fire; as the material melts it is allowed to drop on the package, and a metal die or seal is pressed into the hot wax, leaving the impression of the seal upon it. It is used extensively by express companies in sealing valuable packages, and, by those who follow social customs, in sealing letters. It was first employed in China in the seventh century.

Sea Li'on, a name given to a large group of seals, which, though closely related to the fur seals, are not valued for their coats. There are several species whose members differ slightly in structure and habit. All, however, have long, cylindrical bodies, small, rounding heads with very large ears, and a thick skin. The hairy coat, which is reddish-brown in color, is in some species lengthened at the neck into a mane. Sea lions are generally found in large herds and are as common upon the rocks and beaches, or even some distance from the shore, as they are in the water. The largest species are found in Northern waters and attain a length of 10 or 12 ft. The California sea lions are familiar because of their great numbers along the cliffs of the Pacific coasts. They defend themselves fiercely if attacked, but are otherwise harmless and peaceable. There they are protected by law to preserve them from destruction, though a few are occasionally taken to be trained for use in the circus or to add to the value of a city zoo.

Sea Par'rot. See PUFFIN.

Sea Pigeon, *Pij' un.* See GUILLEMOT.

Searcher, *Sur' cher,* **Bee'tle,** a large and beautiful beetle of the Carabid Family. It may be easily recognized by its vivid coloring and its broad, pointed body. The wing covers are bright metallic green bordered with a fine line of deep red, while underneath, the abdomen is of a brilliant purple hue. The head is black, with prominent beady eyes and long, segmented antennæ; connecting the head and abdomen is an almost circular thorax of metallic purple outlined with green. The six legs are long and also of shiny brilliancy. Sometimes the wing covers are slightly specked or dotted with gray or white spots. The searcher, whose more formal name is scrutator, is a wary bettle that haunts hidden recesses and is most commonly found at twilight on the trunks of trees, where, true to its name, it searches assiduously for caterpillars. It does much good by completely driving out the disagreeable and harmful hairy tent caterpillars. The searcher is a swift runner, and defends itself by a ready bite if caught.



SEARCHER BEETLE

Search, Right of, the right conceded by international law in time of war to the officers of any warship of the contending nations to stop a private trading vessel on the high seas and examine the officers and crew and the ship's papers to determine whether or not the vessel is carrying material designed for the enemy. If found violating the laws of nations in this regard, both vessel and cargo are confiscated. In civil life the right to search private apartments for property that has been stolen or is otherwise unlawfully held is generally recognized. But the investigation must be conducted under authority, in form of a search warrant, formally issued by a magistrate.

Sea'sick"ness, a physical disturbance affecting travelers at sea, which is caused by motion of the ship. The malady is characterized by nausea, vomiting, headache and general weakness. Usually an attack of seasickness lasts only during the first day of the journey and does not return during the voyage, though some persons suffer throughout an entire ocean trip. There are numerous palliative remedies for seasickness. The attack is not apt to be so severe if care is taken in the choice of diet the few days immediately preceding and also during the journey. Those persons who suffer from severe attacks should spend the first day or two in bed and take light nourishment, but confinement should not be continued longer than necessary, as the fresh air often causes the malady entirely to disappear.

Sea Snake. See WATER SNAKE.

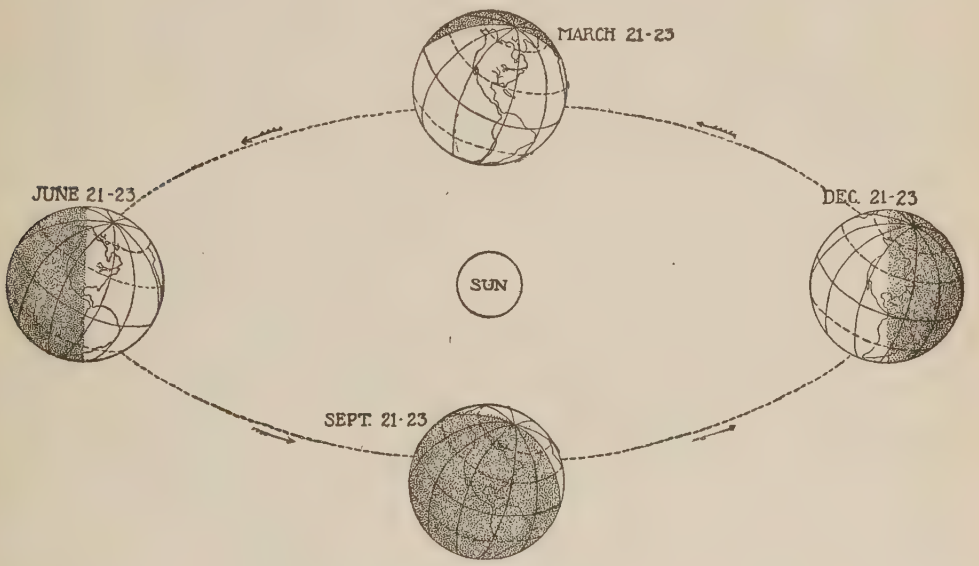
Seasons, *Se' z'nz,* the four periods into which the year is divided by the shifting position of the earth in relation to the sun. They are spring, summer, autumn and winter.

The earth revolves about the sun in about 365.24 days, in a nearly circular orbit. It also rotates upon its axis once every 23 hours and 56 minutes. As the earth moves round the sun its axis at all times points toward the Pole Star and is inclined to the plane of its orbit at an angle of 23½°. Thus the planet presents different faces to the sun at different times of the year. For six months, from March 21 to Sept. 22, the Northern Hemisphere is turned toward the sun, and the days are long, the nights short, the sun's rays fall vertically and the heat is intensive. At the same time the Southern Hemisphere is turned away from the sun, and as the solar rays fall slantingly fewer are intercepted by the surface; the heat, in consequence, is less, and the days are short.

Owing to these motions of the earth the sun appears to travel daily around that planet from east to west and to

move northward for six months and southward the remaining six, and in the course of a year to make two trips, the one in a northerly, the other in a southerly direction, crossing the equator twice each year. In its northward journey the sun crosses the equator March 21-23. In its southward journey it crosses the equator Sept. 21-23. These dates are called the equinoxes, the former the vernal or spring equinox, the latter the autumnal equinox; and at these times the days and the nights are of equal length.

About June 21 the sun reaches its northern limit, appears to stand still for several days, then moves southward, reaching the southern limit of its journey Dec. 21-23, when it again seems to tarry for a time before returning northward. These dates are the solstices; the former is the summer and the latter the winter solstice, for the Northern Hemisphere, vice versa for the Southern Hemisphere. Spring for the Northern Hemisphere may be said to begin with the vernal equinox and end with the summer solstice; summer to follow the summer solstice and end with the autumnal equinox; autumn to last from the autumnal equinox to the winter solstice; and winter to fill the remaining interim between the winter solstice and the spring equinox.



CHANGE OF SEASONS

Sea Squirt, a family of marine animals of the class known as Tunicata. The individuals of this family are mostly barrel-shaped animals of no great size, and remain permanently attached to rocks, stones or seaweed upon the ocean bed. The covering, or mantle, is of leathery consistency and has two openings: one a mouthlike aperture at the top and the other an opening from the gill slits at one side. The sea squirts are abundant on the coasts of Great Britain, where they live singly or in colonies. Those which form colonies are generally brightly colored and unite in a starlike group.

Seattle, *Se at' l,* **Wash.,** the metropolis of the state, a port of entry and county seat of King Co., 1000 m. n. of San Francisco and 185 m. n. of Portland, on an arm of Puget Sound, 129 m. from the Pacific Ocean. The city is the terminus of the Northern Pacific, the Great Northern, the Canadian Pacific, the Chicago, Burlington & Quincy, the

Chicago, Milwaukee & Puget Sound, the Southern Pacific, the Grand Trunk Pacific and other railroads. Seattle is the American port of a large number of Pacific Ocean steamship lines, and also the home port of a fleet of coasting steamers which are operated in its trade with Alaska, Oregon and California. The city has not only great commercial and manufacturing interests but important agricultural, dairying, mining and fishing industries. The first regular line of steamships between Seattle and Japan was established in 1896. Regular sailings are also made to Alaska from Seattle by several steamship companies.

Seattle possesses one of the finest harbors in the world, called Elliott Bay. Lake Washington forms the eastern boundary of the city, and two large lakes, Lake Union and Green Lake, are entirely within its limits. The city has a land area of 58 sq. m. and a water area of 36 sq. m. The general topography of the city is hilly, consisting of several ridges which rise to an elevation of from 250 to 500 ft. above sea level. The street-railway system comprises about 227 m. of track and covers the city with a network of routes. Interurban electric lines extend to Tacoma and Everett and to many interesting points about the city. The water supply is brought from Cedar River, in the foothills of the Cascade Mountains.

Parks and Boulevards. Seattle has 37 parks, with a total area of about 1688 acres. Woodland Park on Green Lake is the largest park of the system. Other parks include Schmitz, Alki Point, Volunteer, Leschi, Madrona, Ravenna, Frink, Cowen, Kinnear, Washington and Mt. Baker. There are 16 well-equipped playgrounds. The south end of the city, bordering on Lake Washington, contains the most scenic portion of the 30-mile boulevard system. From the boulevard extensive views of the Cascade Mountains, Mt. Rainier and Mt. Baker are obtainable at different points. Among other fine drives are the Interlaken, University, Blaine, West Interlaken, Frink and Mt. Baker boulevards. There are many beautiful homes and fashionable residences throughout the park districts. The Capitol Hill addition has been transformed into a section of attractive and well-kept homes. Ft. Lawton, a United States military post, is within the city limits. The site embraces about 600 acres and was donated to the government by the people of Seattle.

Public Buildings. The principal public buildings include a courthouse, Labor Temple, Federal Building, customhouse, Smith Building, city hall, Y. M. C. A. and Y. W. C. A. buildings, modern mercantile establishments, well-equipped hotels, which include the Rainier, the Grand, the Seattle, the Butler and the Washington, handsome office buildings, banks and about 300 churches. St. James Cathedral is one of the finest church edifices in the city. Seattle is the see of a Catholic bishop. A United States assay office was established here in 1898. The Puget Sound navy yard is located across the Sound from Seattle, and has the only government dry dock on the Pacific coast large enough to dock a battleship. A larger dry dock, costing $2,000,000, was begun in 1911, and at Keyport, near by, the government plans to establish a torpedo station.

Institutions. The leading educational institution is the University of Washington. The Alaska-Yukon-Pacific Exposition, held in 1909 on a portion of the university campus, left the institution a number of permanent and useful buildings. Other educational institutions include the Holy Names Academy, College of Our Lady of Lourdes, Seattle College, Washington Preparatory School for girls, Adelphia College, the Brothers' School, an art school, six high schools, including the new Mt. Baker and Queen Anne high schools, and about 64 grade schools. The city has a free public library valued at $1,000,000. There are also eight branch libraries, including the Ballard, Green Lake, University, West Seattle, Columbia and Fremont. Among the leading social clubs are the Rainier, the Elks, the Arctic, the College, the University, the Athletic, the Transpor-

tation, the Metropolitan, the Golf and the Country. The benevolent and charitable institutions include the Lebanon Rescue Mission, House of the Good Shepherd, Kenny Home for old ladies (Presbyterian), Florence Crittenton Home, the Seattle, the General, the Providence, the Pacific, the Minor, the Wayside Emergency, the Municipal and the County hospitals, Mt. Carmel Home, Deaconess Home, the Seamen's Friend Society, a number of societies under Catholic control, a convent of the Carmelite nuns and Hebrew Association charities. The Seattle Parental School is located on Mercer Island.

INDUSTRIES. Shipbuilding is one of the most important industries of Seattle. The fisheries of Puget Sound have also assumed vast proportions, and the city is the headquarters for a large number of companies engaged in the salmon-packing industry of Alaska and other places. The approximate value of the canned salmon is $12,000,000 annually. The state has established a number of hatcheries for the propagation of the salmon. Oyster culture is growing in importance, and the product of the sealing and whaling companies adds to the value of this industry. Seattle has about 1500 manufacturing plants. Among the industrial plants are saw and shingle mills, flour, feed and cereal mills, brickyards, terra-cotta works, machine shops and manufactories of boots, shoes, clothing, woodenware, tinware, furniture, fish nets, confectionery, wagons and carriages, brooms, baking powder, jewelry and other diversified products. The chief exports are live stock, fruit, hay, hops, timber, coal, wheat, potatoes and dairy products. All the gold from Alaska and the Yukon is practically received here, and an immense lumber business is handled in the city.

HISTORY. The first permanent settlement was established in 1852 and the place named from an Indian chief who was friendly to the whites. King County was erected in 1853 and Seattle became the county seat. It was incorporated in 1865 by territorial legislation. In 1889 the city was devastated by fire, but was quickly rebuilt. A new impulse was given the city by the discovery of gold in Alaska and the Yukon territory in 1897. The town of South Seattle was annexed in 1905, and the suburbs of Ravenna, Columbia, South Park, Ballard, West Seattle, Dunlap and Rainier Beach in 1907. Population in 1920, 315,652.

Sea Ur'chin, a family of marine animals of the group called Echinodermata, and thus related to the starfish. They are globular, or melonlike, in form, and have a brittle shell which is covered with spines. These spines have hollow bases which fit into the protuberances upon the shell and thus form a sort of ball and socket joint that allows great freedom of motion. The movement of the spines is the means of locomotion of the animal. Protruding from tiny openings in the shell are numerous sucker-feet which extend in ten rows and also aid in movement, add to the shell deposit, and are said to be the seat of the sense of smell. The large, circular mouth is closed by means of five triangular, valvelike flaps. When the skin and spines of the sea urchin are removed the shell shows five geometrically-marked rows of plates. Sea urchins are found throughout the Atlantic, where the different species have various local names, and many are valued as food.

Sea'weed", a class of plants scientifically known as the algæ, and, as their name implies, growing in water. They vary in size from microscopic, one-celled plants to gigantic growths which cover a wide area of the sea floor and extend their long, waving branches up to the surface of the water. In general, they are soft-stemmed plants with much reduced leaves, and they may be rooted or free-swimming. They derive their food from the water and differ from aquatic plants in being flowerless. The seaweeds reproduce by spores, which take the place of seeds, and have an intricate method of reproduction.

Seaweeds of various kinds have long been used in the production of alkali, iodine, agar-agar and vegetable glue, but

recently numerous other uses have been found. The French use it as fertilizer for their fields, and in Brittany and the Orient, especially Japan, it is used in a variety of ways as a food. It is a recognized cure for goiter and scrofula because of the iodine which it contains, and some varieties form an excellent vermifuge. In England a method has been discovered for making cloth from the soft but strong fiber of one species. The fiber curls much like wool, is easy to spin and takes any dye except green. A white variety near the coast of Kent supplies trimmings for ladies' hats. See ALGA; KELP.

Sebas'topol, or Sevas'topol, Siege of, the principal event in the Crimean War, lasting from October, 1854, to September of the next year. France and England aided Turkey against Russia, and attacked her port, Sebastopol, on the Black Sea. The fortifications were considered impregnable with a garrison of 30,000 men. The allies lost 60,000 and 84,000 Russians fell. After the surrender the English made a thorough destruction of the docks and fortifications, and by the Treaty of Paris Russia was forbidden to have a large naval force on the Black Sea. This restriction was removed in 1871. The city has been rebuilt and is now a Russian naval station. See CRIMEAN WAR.

Secession, *Se sesh' un,* a term used to signify the withdrawal of a state from a federal union. Secession is based on the theory that the sovereignty of the individual states forming a federal union has not been absorbed into one general sovereignty. The history of Europe furnishes several attempts to secede, but secession in theory and practice is best exhibited in the history of the United States. Nearly all of the original states, and many of the later ones at some period when their rights were in danger, proclaimed that their sovereignty might be exercised in secession. This right was claimed upon the fact that each state was sovereign, becoming so by resolution against England, and that the Treaty of 1783 recognized them as "free, sovereign and independent states." This fact was recognized in the Articles of Confederation and not surrendered, the secessionists claimed, under the Constitution. Between the years 1845 and 1860 secession came to be accepted by the South as the means of preserving her institutions from what was claimed to be Northern interference. In 1861 several states virtually seceded and formed the Confederate States. See CONFEDERATE STATES OF AMERICA.

Secretary, *Sek' re ta ry,* **Bird,** the most peculiar bird of prey. The body is about the size of a large hawk, but the legs are two feet in length and the neck is longer than is usual in birds of this class. The claws also are blunt and not hooked. The bluish color is contrasted by the black markings on the under parts, as well as on the wings and tail. The food, to some extent, consists of rats and other small Rodents, but is principally made up of snakes, venomous as well as harmless, which the bird boldly attacks, using its outstretched wings to receive the blows delivered by the snake. The secretary bird ranges throughout southwestern Africa and is particularly abundant near Cape Province, where it is protected. The name was suggested by the bunch of feathers at the back of the head, which resemble pens stuck behind the ear.

Secre'tion, in physiology, the separation from the general nourishing fluid, as the sap in plants and the blood in animals, of fluids differing in composition from that from which they are separated. This article is confined to secretion in animal physiology. Secretion is performed by glands (See GLAND), and the secretions perform various functions. Those in the alimentary canal, such as the gastric juice, bile and pancreatic juice, aid in digestion, and others serve the purpose of elimination. The blood is the great source from which secretions are obtained. See BLOOD; DIGESTION; STOMACH; INTESTINES.

Se'cret Serv'ice, that branch of the organization of the government whose

duty it is to detect fraudulent and criminal practices and gain information upon subjects of a private nature. In the United States each of the several executive departments has its own secret service, the most important of which is that of the treasury, which is engaged chiefly in detecting and arresting counterfeiters and in preventing the violation of revenue laws. During the Civil War the secret service rendered invaluable aid in every field which demanded accurate information and speed in the dispatch of secret intelligence.

The operations of the secret service are under the direction of a chief, who is given a first assistant and an ample clerical force. The country is divided into 28 districts, and the official in charge of the force in the most important city, who is known as the operator in charge, is the chief officer of the district. It is deemed proper to withhold from the public all information relative to the number of operatives, names, stations, etc. Any department at Washington may make requisitions for operatives at any time. There is also a regular detail whose duty is the protection of the president and other notables who are in the national capital on official business.

Seda'lia, Mo., a city and the county seat of Pettis Co., 188 m. w. of St. Louis, almost in the center of the state. Entering the city are the Missouri Pacific, the Missouri, Kansas & Texas and other railroads. Sedalia is in the center of a productive farming and livestock region, rich in deposits of coal, fire clay, shale (suitable for sewer pipe) and limestone. Its railroad and manufacturing interests are important, embracing extensive car shops, foundries, iron works, flour and woolen mills. Located here are manufactories of shirts, trousers, overalls, shoes and carriages. There are also beef and pork-packing plants and a horse and mule market.

Sedalia occupies an elevated and healthful site in an undulating prairie region, and has many handsome buildings and beautiful shade trees. The principal buildings are the courthouse, Y. M. C. A. building and the Carnegie library. Other notable features are the George R. Smith College (Methodist Episcopal), founded in 1894 for negroes; the convent school of the Sisters of St. Joseph; and hospitals and parks, a state fair is held annually in splendidly equipped grounds adjoining the city, reserved for the purpose by the Missouri State Board of Agriculture. Sedalia was established in 1857, and was a military post of the Union army throughout the Civil War. It was captured in 1864 by a force of Confederates, who held the post several days. Sedalia received its city charter in 1899. Population in 1920, 21,144.

Sedan', Battle of, a famous battle of the Franco-German War. In the latter part of August, 1870, the French leader, Marshal MacMahon, set out from Châlons for the purpose of bringing relief to Marshal Bazaine, locked up in Metz by the German forces. As MacMahon was unable to effect the relief of Metz, he occupied the fortress of Sedan, together with the heights to the east, north and west. On the first of September the Germans began the attack of the outlying defenses. The French were driven back on Sedan, and the bombardment of the town began late in the afternoon. Seeing the futility of further resistance, Emperor Napoleon III, who was in the town, ordered the flag of truce raised, and the following day the terms of capitulation were arranged with Bismarck and Moltke. About 86,000 men and officers, including the Emperor, were made prisoners. The news of the fall of Sedan in Paris caused the overthrow of the Second Empire. See FRANCO-GERMAN WAR.

Sedative, *Sed' a tive,* any agent which tends to quiet the nerves, moderate pain and soothe irritability. Many drugs act as temporary sedatives but tend, in their after effects, to bring back the discomfort in greater strength. Others affect only certain organs and still others act only under certain conditions. Among the best-known sedatives are opium, morphine and camphor.

Sedge, *Sej,* a group of rushlike plants classed together in the Sedge family. Among the sedges are included many of our marsh grasses, the bulrushes of pond and lake sides, and the edible sedge of Mediterranean regions. The latter is the plant whose tubers are called earthnuts, or chufa, and are eaten like nuts. Sedges frequently have hollow, three-angled or cylindrical stems with lilylike or inconspicuous flowers. The leaves, when present, are stiff and flat and contain sufficient silica to make them of poor value as fodder. The sedges in general are of little economic value, although one species is the rush which furnishes the material for rush-bottomed chairs, and the papyrus which was used by the ancient Egyptians in making papyrus. See EARTHNUT; PAPYRUS.

Sedgwick, *Sej' wick,* **John** (1813-1864), an American soldier, born at Cornwall, Conn. He graduated from West Point in 1837, served in the Seminole War and in the war against Mexico, and in August, 1861, was commissioned brigadier-general of volunteers. He distinguished himself during the Peninsula Campaign and rendered effective service at Antietam, Chancellorsville, Fredericksburg and at Gettysburg, where he commanded the Union left wing. He accompanied Grant in the campaign upon Richmond in the spring of 1864 and performed valiant service at the Battle of the Wilderness, but was killed near Spottsylvania Courthouse, while superintending the planting of a battery.

Seed, the developed ovule of the plant, from which the new individual is produced. Seeds are generally provided with stored-up nourishment by which the growing plant can live until further food is provided by new leaves and roots; thus they are capable of remaining dormant for a long time and of still retaining their vitality.

In structure seeds are made up of seed coats, which differ greatly in different plants, as in the cherry pit, flaxseed and squash. Within these seed coats, and generally nearly filling them, is the embryo of the new plant, which consists of one or more seed leaves, or cotyledons, borne upon a short stalk. Plants which differ in the number of cotyledons in the seeds also differ so greatly in later development that they are accordingly classified as monocotyledons and dicotyledons. In germinating, the cotyledon of the monocotyledonous plant remains enclosed in the seed; in the dicotyledonous the cotyledons break from the seed coats and from the seed leaves, which rarely fulfil the functions of true leaves.

Many seeds, whether monocotyledonous or dicotyledonous, have the embryo surrounded by a white deposit which has been likened to the white of egg, and hence is called, rather incorrectly, albumen or endosperm. The albumen forms the greater part in wheat, rice and coffee, while in pears, beans, nuts, etc., the space is entirely taken up by the embryo. In both of these forms the stored-up food is made much use of by man and lower animals. See GERMINATION.

Seed'er, a machine for sowing small seeds. The term is applied sometimes to a drill (See GRAIN DRILL) and frequently to a planter (See CORN PLANTER), but its most general application is to that form of machine which is made to scatter broadcast various small seeds that do not require covering. This machine consists of a canvas bag or hopper holding the seed, supported by a wooden box, within which is a small disk wheel, so geared that by turning a crank it is revolved at a very high speed. Seeds fed into a groove adjacent to this disk wheel are scattered by it in a semicircle to a distance of from 5 to 15 ft. Small machines of this sort are usually carried by the operator, being suspended from his shoulders by straps. Large machines are attached to the rear end of a wagon and operated by one of the wheels.

Seidl, *Zi' d'l,* **Anton** (1850-1898), a famous orchestral conductor, born in Budapest, Hungary, and educated at Leipsic and Vienna. Having gained fame as Richard Wagner's assistant conductor and as a general conductor and leader, he succeeded Leopold Damrosch

at the Metropolitan Opera House, New York, in 1885, in this incumbency producing German opera and developing a strong orchestra. Besides having other musical associations and making several concert tours, Seidl conducted at the Wagner Festival in Baireuth in 1886. In popularizing musical culture in America he ranks with Theodore Thomas.

Seidlitz, *Sed' lits,* **Powders,** a combination of two kinds of powders separately compounded but taken together. One consists of 40 grains of bicarbonate of soda and two drams of Rochelle salt and is always wrapped in a blue powder paper; the other is 35 grains of crystalline tartaric acid and is done up in white paper. Each powder is dissolved in half a tumbler of water and the two are poured together. They should be taken while effervescing, a process which indicates the escape of carbon dioxide. Seidlitz powders are prescribed by physicians as a mild cathartic and take their name from the town of Seidlitz, Austria, where a mineral water, which has similar chemical properties, is found.

Seine, *Sane,* a river of France. It rises in the Department of Côte-d'Or, on the Plateau of Langres, flows rapidly in a northwest course and passes through the city of Paris, after which its route becomes slow and winding until it empties into the English Channel through a wide estuary at Havre. It is 472 m. in length and is navigable 337 m. Canals connect it with the Loire, the Rhône, the Rhine, the Schelde and the Meuse rivers. There are several locks between Paris and Rouen, and large engineering works have been erected, facilitating navigation on the Seine, which has become one of the principal commercial waterways of France. Beyond Paris the shores of the river are attractive and picturesque.

Seismograph, *Sis' mo graf,* or **Seismometer,** *Sis mom' e ter,* an instrument for indicating motions and tremors on the earth's surface. Its simplest form is a cup of molasses, by which a tremor is shown when the liquid is raised beyond its normal surface and a film of it is left on the side of the cup. The instrument employed by scientists registers movements of the earth by means of pointers which trace lines on smoked glass, indicating vertical and horizontal directions and the violence of the disturbance. Sometimes clockwork or timing mechanism is attached to show the time and length of duration of the shocks. Electrical devices are added to those used in most astronomical observatories.

Select'men, a name given to the chief officers of a New England town. In England the parishes had their vestries, which were of two sorts, common vestries composed of all the ratepayers, and select vestries. In the latter, affairs were managed by select vestrymen. Hence comes the term *selectmen,* as used in New England for the governing board of a town. At each annual town meeting there are chosen not less than three nor more than nine selectmen. In very small townships the selectmen themselves may act as assessors of taxes or overseers of the poor. They have, in fact, the general superintendence of all the public business save such as is expressly assigned to the other officers, and when circumstances seem to require it they are authorized to call a town meeting. See Town Meeting.

Sele'nium, a rare element, though quite widely distributed. In Mexico it has been found free, but it is generally found in ores of lead, copper, iron, silver or thallium. There are three varieties: a red crystalline form, a bluish-gray metallic variety and a soft red precipitate. Up to 1910 selenium was of little commercial importance, although it was one of the elements used in the manufacture of glass. Owing to some recent developments the element is now being used in coloring glass and in transmitting pictures by wire.

Seleucidæ, *Se lu' si dee,* the dynasty which secured control of the portion of Alexander the Great's dominion included in a large part of western Asia, particularly Syria, the Eastern Provinces and

a large part of Asia Minor. The dynasty was founded by Seleucus I Nicator (312-280 B. C.), who in the second division of Alexander's domain secured Babylonia. With the aid of Antigonus he added Susiana to his dominions. A misunderstanding between him and Antigonus caused Seleucus to go to Egypt, where he remained four years. He then returned and resumed his rule, which continued successfully until he was murdered in 280 B. C. Following Seleucus I were a number of kings, none of whom obtained any mark of distinction until Antiochus III the Great (223-187 B. C.). He was the first of the line to come into conflict with Rome, by whom his army was defeated in 190 B. C., and he was forced to give up a large part of Asia Minor. The decline of the Seleucidæ dates from this defeat. With varying fortunes the dynasty continued until 64 B. C., when their kingdom was converted into a Roman province by Pompey.

Se'lim, the name of three sultans of Turkey.

Selim I (about 1467-1520) became sultan in 1512 by dethroning his father, whom, with his brothers and nephews, he caused to be slain. He waged a successful war against Persia and against Egypt, which he made tributary to the Turkish Empire. The title of Imam and the standard of the Prophet were conferred upon him, and by this act the Sultan of the Ottoman Empire became chief of Islam and has ever since been regarded as the representative of Mohammed by the Mohammedan world. Selim II (1524-1574), son of Solyman the Magnificent, accomplished nothing of note. During his reign, in 1571, the Turks suffered a crushing naval defeat at Lepanto.

Selim III (1761-1808) succeeded Abdul-Hamid I in 1789. He inherited a war with Russia, which was closed by treaties with Austria and Russia. Selim inaugurated a progressive policy and thereby counteracted many dangers that were threatening his empire, but his attempts to reorganize the army and to introduce new industries aroused such an opposition that a rebellion broke out and he was obliged to abdicate in 1807.

Seljuks', a Turkish dynasty, named after Seljuk, a chieftain of the Ghuz Turks. The Seljuks ruled the greater part of western Asia during the 11th and 12th centuries. They overthrew the Byzantine ruler in 1071 and later closed to Europe the overland trade routes to the East. They overran Palestine and occupied Jerusalem the same year. This led to the Crusades, during which they came in contact with the armies of western Europe (See CRUSADES). This closing of the overland trade routes to Europe was the first great stimulus to discover a water route to India, so that indirectly they were responsible for the voyages which circumnavigated Africa and led to the discovery of America.

Sel'kirk Mountains, a range of mountains lying in the southeastern part of British Columbia between the Gold Range and the Purcell Range, and extending northward from the northern boundary of the United States. These mountains are remarkable for their magnificent scenery, their wild virgin forests, their lofty summits and their great glaciers. The most noted peaks are Sir Donald, Mt. Dawson and Mt. Bonney, all between 10,000 and 11,000 ft. in height. The region of the Selkirks has become famous for its scenic attractions and is visited annually by tourists and campers. Glacier House, a great resort, has been built on the slopes of Sir Donald.

Sel'ma, Ala., a city and the county seat of Dallas Co., 50 m. w. of Montgomery, on the Alabama River, the Louisville & Nashville, the Southern and the Western of Alabama railways. It has regular steamboat service to Mobile, Montgomery and other river points. In the surrounding country cotton is the principal crop, but hay and other forage crops are extensively grown. Selma's cotton receipts will average about 125,000 bales annually. Pine and hardwood timber is plentiful and the lumber industry is flourishing. Live-stock raising

is one of the most profitable activities of the section. In addition to cotton factories, cotton gins, cotton compresses, cottonseed-oil mills and cotton warehouses, there are in the city and immediate vicinity planing mills, gristmills, railway repair shops, ironworks and manufactories of wagons, machinery, boilers, boxes, brick, automobile spokes, candy, cigars and fertilizers.

Chief among the educational institutions are Dallas Academy, Baker School and the Alabama Baptist Colored University, opened in 1878, and one of the largest colored schools in the South. Other noteworthy features of the city are the Y. M. C. A. Building, a Carnegie library, the Alabama Methodist Orphanage, two hospitals for whites and one for colored people, a new post office, courthouse, Elkdale Park and a fine river bridge. On the site of an earlier boat landing, called Moore's Bluff, the town was established in 1817, receiving its present name in 1820; it was chartered as a city in 1852, and is at present governed under a revised charter of 1900. During the Civil War the city was the center of military operations of the Confederate army, and near the close of the war, in 1865, it was captured by the Federal forces under Gen. J. H. Wilson. Selma was the home of Senators William Rufus King, John Tyler Morgan and Edmund Winston Pettus. Population in 1920, 15,607.

Sel'vas, the name of the forest-clad plains of the Amazon. They occupy the lowlands in the region of heavy tropical rainfall in the northern part of Brazil and the extreme southern part of Venezuela. They form the area of densest vegetation in the world, consisting of great trees encircled with twining plants and underbrush, which form impenetrable thickets. The rubber tree is found here in great abundance, and many of the other trees are valuable for lumber.

Semaphore, *Sem' a fore,* originally a signal post containing arms moving on a pivot and used by the French Government in place of the telegraph for transmitting signals long distances. With the perfection of the telegraph this use of the semaphore was set aside. Semaphores are now used by railways in signaling trains. The railway semaphore consists of a tall post, to which are attached one or more arms and lanterns for night signaling. When the arm is in a horizontal position it indicates danger, and means stop; in a vertical position, it means a clear track; and in an oblique position, it means proceed with caution. At night lights corresponding in meaning to the day signals are shown. Semaphores are operated from signal towers by electric power. See BLOCK SIGNALS; RAILROAD, subhead *Operation.*

Sembrich, *Zem' brik,* **Marcella** (1858-), a celebrated soprano singer, born in Poland. Her real name was Marcelline Kochanska, but for professional purposes she adopted the name of her mother. Her father was a professor of violin and piano, and the child was taught the technique of these instruments from the age of six years, becoming, with careful and scholarly instruction, proficient in these two branches before she essayed vocal parts. It has been this thoroughness and all-round training of a wonderful talent, united with a glorious voice, a sensitive temperament and musical taste, that have made this artist one of the most finished and pleasing of light sopranos of her day. She married Professor Stengel, a former teacher.

Sem'inole, a subtribe of the Creek Indians, early established in southern Florida. For a money consideration they had agreed to remove voluntarily to Indian Territory. One-third were to go in 1833, one-third the year following and the remainder in 1835. However, when the time came they refused to leave Florida, and when they feared that force was to be used against them they rose under their chief, Osceola. They committed various outrages and then fled to the Everglades. Zachary Taylor won an important victory over them in 1837. This border warfare lasted from 1835 to 1842, and it cost the United States 2000 lives and over $15,000,000. The Seminoles

were finally transported to Indian Territory without their chief, who died in prison at Ft. Moultrie, Charleston. See Osceola; Five Civilized Tribes.

Semir'amis, a legendary Queen of Assyria, daughter of the fish goddess, Derceto of Ascalon, and a Syrian youth. Exposed by her mother to die, she was fed by doves, discovered and brought up by a shepherd and married to Menones, the governor of Nineveh. Ninus, King of Assyria, asked her of her husband, and added threats when he refused to give her up; whereupon Menones killed himself. The most extravagant tales are told of her. She led armies against Egypt, Persia and other countries. At last her host of 3,000,000 foot soldiers, 500,000 horsemen and 100,000 war chariots was defeated on the Indus with one-third loss by Stabrobates. After this defeat she vanished in the form of a dove.

Sem'ites, a group of peoples related in many respects by physical and mental characteristics and by language and religion. As now used, the term includes Babylonians, Assyrians and Chaldeans; Phœnicians, Carthaginians and other Canaanites; Israelites (Hebrews), Edomites, Moabites and Ammonites; Arameans; Arabians and Ethiopians. They belong to the white Caucasian race. These peoples as a whole have always excelled in commerce and industry rather than in warfare and statecraft, and in morals and religion rather than in science and art. They have, however, served science faithfully by transmitting knowledge received from others. The greatest debt the world owes to any Semitic race is the monotheistic religion perpetuated by the Hebrews. The term *Semite* comes from *Shem,* the name of one of the sons of Noah, though the classification given in *Genesis* is not exact.

Semit'ic Languages, the name usually applied to a group of languages belonging to the Semitic peoples. There are two chief branches of this speech—the northern and the southern. To the former belong the Babylono-Assyrian, the Aramaic and the Hebræo-Phœnician; to the southern, the Arabic and the Ethiopic. The Semitic speech is of limited extent; with the exception of the Hebrew and modern Arabic, the Semitic groups are confined to the region included within the Mediterranean and Euphrates, the Indian Ocean and the Taurus Mountains. Three forms of writing are employed in the groups comprising the Semitic languages: (a) the cuneiform characters of Babylonia and Assyria; (b) the Phœnician alphabet and its derivatives; (c) the Ethiopic alphabet. A striking feature of this group of languages is that the roots consist regularly of three consonants, which always remain unchanged.

Semmes, *Semz,* **Raphael** (1809-1877), an American naval officer, born in Charles County, Md. In 1832 he entered the navy, having previously studied law, did coast-surveying duty, was volunteer aid to General Worth in the Mexican War and in 1858 became secretary to the lighthouse board. In the Confederate service of the Civil War he commanded the *Sumter* and the *Alabama,* capturing many prizes. During the famous encounter with the Federal ship *Kearsarge,* off Cherbourg, France, June 19, 1864, the *Alabama* was sunk, after which Semmes was given charge of the James River Squadron. Though imprisoned after the war, he was liberated at the amnesty. Thereafter he practiced law and was professor of moral philosophy in the State Seminary of Louisiana, at Alexandria. He wrote a number of works, including *Service Afloat and Ashore During the Mexican War; The Cruise of the Alabama and Sumter.* See Alabama Claims.

Sen'ate. See Congress.

Seneca, *Sen'e ka,* a tribe of North American Indians, the most important tribe of the Six Nations, or the Iroquois League. They lived in the western part of New York State. They guarded the frontier of the League and were the strongest tribe in war. They fought with the English in the Revolutionary War. They now live in Oklahoma, New York State and Ontario, and number about 2700. See Iroquois.

Seneca, Lucius Annæus (about 4 B. C.-65 A. D.), a Roman Stoic philosopher, son of the rhetorician Annæus Seneca. He was brought to Rome in his boyhood to be educated, and here attended the lectures of noted philosophers. After gaining distinction for eloquence and serving as quæstor he was banished in the year 41 to Corsica, because of the enmity of the wife of the Emperor Claudius, but was recalled in 49 to become the tutor of Nero, then 11 years of age. During the first few years of Nero's reign Seneca exerted a beneficial influence over the Emperor, but later, falling into disfavor, was accused of taking part in a conspiracy and was ordered to commit suicide. Seneca was an earnest seeker after truth and the most brilliant literary man of his time. Although not a profound thinker, he presented principles for the guidance of daily life in a broad-minded and sympathetic way. His writings consist of 12 ethical treatises, some of the titles of which are *On Providence, On Consolation* and *On the Perseverance of Wise Men;* a number of epistles; seven books on *Investigations of Nature;* and ten tragedies. The tragedies were composed to be read aloud instead of to be acted, but they had a great influence on the drama of the Renaissance.

Seneca Falls, N. Y., a city of Seneca Co., 160 m. n. w. of Albany and 37 m. s. w. of Syracuse, on the Seneca River near Cayuga Lake and on the Lehigh Valley and the New York Central & Hudson River railroads. The Mynderese Academy and the Johnson Home for Indigent Women are located here. Cayuga Lake Park, three miles distant, is a summer resort of some prominence. The Seneca River at this point falls 50 ft. and affords abundant water power. Seneca Falls has manufactories of pumps, hydraulic and foot-power machinery, hook and ladder trucks, fire engines, advertising novelties, etc. The town was settled in 1791 and incorporated in 1831. Population in 1920, 6389.

Seneca Lake, a long, narrow lake in the west-central part of New York, extending from Watkins northward to Geneva. It is 37 m. long and has an average width of 2 m. and a depth of 600 ft. It is noted for its beauty and as a pleasure resort.

Senegal, *Sen" e gawl',* a French possession of West Africa, which by recent decree has had its limits somewhat lessened and quite accurately defined. It consists mostly of infertile land, having a hot, unhealthful climate. Along the Senegal River, however, there are large forests, and peanuts, rubber, gums and cattle are produced for exportation. The chief cities are St. Louis and Dakar. The colony is directly governed by a lieutenant-governor, who is responsible to the governor-general of French East Africa, and sends one representative to the French Chamber of Deputies. Population, 915,000.

Senegal River, a river of western Africa, rising in the highlands of French West Africa and flowing west and north through Senegal to the Atlantic Ocean. It is a broad river, nearly 1000 m. in length and navigable for many miles. In the highlands there are many falls and cataracts, but nearer the coast it is sluggish and slow. Many of its tributaries are streams of some importance. The Senegal is the first large river on the western coast south of Morocco.

Sen"egam'bia, a name formerly applied to the great region of western Africa, lying between 8° and 18° north latitude and reaching eastward from the Atlantic to the Sudan. Since the decrees of 1902 and 1904 the name has been applied to the interior French possessions east of Senegal, and the region is more accurately known as the Senegambia and Niger territories.

Sen'na, a bitter drug obtained from the leaves of the cassia, and valuable in medicine as a cathartic and a tonic. The product prepared in different countries differs according to the place from which it comes. The purest is probably that imported from India. The leaves of the American senna, or Maryland cassia, have been used in place of foreign sennas, but produce an inferior drug. See CASSIA.

Sennacherib, *Se nak' er ib,* King of Assyria from 705 to 681 B. C., son and successor of Sargon II. Early in his reign he put down a revolt of the Babylonians, captured Sidon and the cities dependent upon it, and defeated the Egyptians. He also subdued Hezekiah, King of Judah, from whom he exacted a heavy tribute. In a second expedition against Judah, Sennacherib's army, according to Jewish account, was destroyed by a pestilence. In 689 B. C. he burned the city of Babylon and exiled its inhabitants. Sennacherib was assassinated in 681 B. C. by two of his sons, and in 680 B. C. a third son, Esarhaddon, was proclaimed king.

Sensa'tion, in psychology, the faculty or consciousness by which we experience ideas of sense. It depends upon the stimulus given to a nerve, the transmission of the impression to the brain and the reaction of the brain in response. Knowledge is received through the senses, and the effect produced upon the brain is the sensation. Sensations are of two kinds, general and special. The former are those that spring from our physical condition, as fatigue, hunger, thirst, etc. They are systems of warning which watch over the body to keep it in a state of health; thus they are noticed when the body needs rest, food or drink. Special sensations are those received through the organs of special sense, and by means of them most of one's knowledge of the world is attained. Each sense organ responds to those stimuli which it is fitted to receive, but to no others; thus light affects the eye, and sound affects the ear.

The intensity of a sensation depends on both external and internal causes. Among the former are the amount of the stimulus and the newness of the impression; among the internal causes are the attention given to the sensation, the length of time in which it acts, the contrast between it and the preceding sensation, and the condition of the mind and body. There is, however, a twilight zone, called the threshold of consciousness, beyond which stimuli cannot affect the mind; thus certain colors supposed to be visible to the ocelli of insects are not perceived by the human eye, and tones of less than 16 vibrations per second are inaudible to the human ear, though probably perceptible to the dog's ear. There is great variation as well in the threshold of consciousness of different people, which enables some to hear, see, taste, smell or feel what others cannot.

Development of Sensation. The cultivation and training of the senses is one of the prime objects of modern education, although up to the present time the senses of sight and hearing are those chiefly given attention. That the sense of feeling may be as greatly developed is shown in the skilled touch of the surgeon and the almost seeing touch of the blind. The senses of taste and smell probably are as capable of development as the others, if given the same amount of training. The senses develop slowly after birth; touch is probably the first to awake, then sight, taste, smell, and lastly hearing.

Sensitive, *Sen' si tiv,* **Plant,** a peculiar Southern plant of the Pulse, or Pea, Family, native in South America and brought to the United States as a curiosity. It is a small herb with trailing stems covered with prickly hairs. The leaves are composed of four leaflets, which in turn are made up of many smaller scalelike leaves that slightly overlap each other. When roughly touched or in any way jarred these little leaflets quickly fold over each other and flatten against the midrib. The individual stems and main

SENSITIVE PLANT

stem, as suddenly, droop, and the entire leaf has the aspect of having suddenly withered. If the disturbance is not repeated, after a time the leaves will slowly unfold and become erect once more. The entire mechanism of this movement is not fully understood, but the source is known to be at the base of the leaf and leaflet stalks. The flowers of the sensitive plant are rose-colored, having four or five sepals and four or five petals more or less united at the base. The fruit, like that of all members of this family, is a pod.

There are several shrubby sensitive plants growing in Texas and west, but the herbs, which are found wild in the United States, grow generally upon the shady river banks of the Gulf States. Sensitive brier, an allied species, is much like the sensitive plant, but closes only when disturbed by very rough handling.

Seoul, *Se ool'*, the capital of Korea, situated on the Han River, 19 m. n. e. of Chemulpo, its seaport. The city lies in a valley surrounded by rugged hills and is surrounded by walls, through which there are eight gateways. The city is divided into four parts by two broad streets which cross at right angles. The other streets are narrow and crooked. The chief buildings include the old and new royal palaces, the Temple of Confucius, the temple of royal ancestors and the Roman Catholic Cathedral. Most of the dwellings are mere hovels. Seoul has railway communication with Chemulpo and telegraph communication with the world. The city is lighted by electricity, and there are several schools for teaching foreign languages. Population in 1911, 278,958, of whom 38,397 were Japanese.

Se'pia, a dark brown fluid found in the ink bags of certain cuttlefish which excrete it to darken the water and so conceal themselves from pursuers. Sepia is made use of in the manufacture of the brown pigment of water colors, called sepia, and in India inks. The ink bag is removed from the fish and the contents speedily dried to prevent decay. The resulting powder is treated with caustic alkalies and then acids, and is placed upon the market in sticks. The sepia of oils is not true sepia, but is a pigment of the same shade derived from other sources. See CUTTLEFISH; INK.

Se'poy, the name usually applied to the native Indian soldiers of the British army. The Sepoys come from all tribes and classes in India and have formed a part of the British forces of that country since the middle of the 18th century. Dissatisfaction with their condition led to the Sepoy Rebellion in 1857, but with that exception they have always been loyal to the British Crown.

Septem'ber, the ninth month of the year, containing 30 days. The name is derived from the Latin word for seventh, as this was the seventh month of the old Roman year. When the calendar was changed by the adding of January and February, the name of September remained unchanged, although it became the ninth month. The autumnal equinox occurs about the 22nd of this month. See CALENDAR; EQUINOX; MONTH; YEAR.

Septuagint, *Sep' tu a jint,* the name given to the Greek translation of the Old Testament, so called from the supposition that the 70 (72 exactly) members of the Sanhedrin wrote it. It was written in Greek and at different times, part of it possibly as late as 100 B. C. It contains the Apocrypha and forms the basis of the Latin translation called the Vulgate, which, in turn, forms the basis of the Catholic Bible. See BIBLE; VULGATE.

Sequoia, *Se kwoy' a,* name given to two species of trees of the Pine Family, both of which are famous for their size and their great age. They are found in scattered groves upon the slopes of the Sierra Nevadas, where they are among the most interesting sights to the tourist and the great pride of the entire country. The groves are constantly patrolled by a troop of the United States cavalry and are thus preserved from wanton destruction.

Both species of sequoias are evergreen and have straight columnar trunks, which are bare of branches beyond the

height of many trees; the reddish bark is curiously ridged in curved or twisted furrows and the horizontal or angled branches bear featherlike leaves of flat leaflets, much like those of all pines. The fruit is a small, oval, persistent cone, whose woody scales open to discharge seeds so tiny that it seems impossible that the germ of the forest giant could lie therein.

The evergreen sequoia, or redwood of California, grows in great forests upon the ocean side of the Coast Range. Its average height is 275 ft. and diameter 22 ft. The most frequently visited grove is the one near Santa Cruz, about 70 m. south of San Francisco. The redwoods are valuable for their lumber, which is light or dark red in color. The wood is soft, but takes a high polish, and is able to resist the ravages of fires, decay and insect pests. It is used in great quantities in California for house lumber, shingles, paving blocks, railway ties, tanks, poles, etc. Posts about old Ft. Brady, in California, that were set in 1851, were taken up not long ago and were found intact. This marvelous power of resisting decay has led to their being used more and more by the farmers of the Middle West for posts and tanks. Until recently, however, the cost of transportation has been almost prohibitive. The task of cutting the trees and transporting them to mills requires the services of experienced woodsmen who are able to fell the trees without injury and bring them to the mill with the least possible waste. See LUMBER.

The Washington sequoias, or big trees, are the patriarchs of the family. Old when Rome was young, older indeed than the Pyramids, they are, without doubt, the oldest living things in the universe. Dr. Jordan, of Leland Stanford University, says that the largest of these may be 7000 years old, and even the youngest ones in this forest group have attained the age of 2000 years. The groves of big trees are usually at an elevation of from 4000 to 6500 ft. on the western slope of the Sierras, where they are, in general, easily accessible. In spite of their great size, their roots are not deep and their growth is graceful and symmetrical. The tallest tower to a height of over 400 ft. The bases are especially large, having broad buttresses that make the ordinary circumference over 90 ft. The largest so far known is a recently discovered giant whose circumference is 109 ft. The bark is often from 1 to 2 ft. in thickness and is soft and fibrous in texture. King, the geologist, says that their longevity is due to the atmosphere, the even climate and the great breathing power of the tree.

It is believed that before the Glacial Epoch the Washington sequoias were much more widespread than now. The most commonly visited groves are the two first discovered—the Calaveras and the Mariposa. The first of these was discovered by A. T. Dowd, a hunter, who in the spring of 1852 followed a wounded grizzly into this marvelous grove. The story of his find was only laughed at, however, until he led others to the spot. The Mariposa grove was not found until three years later, when a young man named Hogg reported that he had found a similar grove. Since then some six other groves have been discovered and reserved as parks.

Some idea of the remarkable size of these trees is gained through stories of what has been done or what might be done with some of these forest monarchs. The trunk of one, which fell some years ago, has been hollowed by burning and has formed a tunnel, through which a man may ride 90 ft. on horseback and then emerge by means of an opening made by the breaking of one of the immense limbs. Another, a standing tree, has been cut into, and through the seemingly uninjured trunk a roadway has been made broad enough to allow the passage of a coach. The stump of another, one of the few of the largest that have been cut, has been polished, and upon it a dancing pavilion erected which will accommodate an orchestra, 20 couples and a few spectators. A roadway for a six-horse coach of 16 passengers has been made along the prostrate body of an-

other, which has lain so long that 6 ft. of earth have accumulated about it since its fall. This one is said to contain 50,000 cu. ft. of lumber and to weigh nearly 3,000,000 lb. One was for three years the one-room cabin of a hunter, and proved a satisfactory retreat.

Some one mathematically inclined has estimated that from one of these trees a covered box could be made which would completely incase the ocean liner *Lusitania;* that its lumber would make one pole 40 m. high or supply a line of poles from Kansas City to Chicago; that 24 m. of board fence 6 ft. high would scarcely use all of its wood; that the Masonic Temple of Chicago might be completely boarded over by the material from one tree; or that 800 m. of rails might be furnished, sufficient to have kept a rail splitter, splitting 150 rails a day, busy for several years.

The majority of the trees have been named. "Old Goliath," "The Sentinels," "The Twins," "General Sherman," "Rob Roy" and "Wawona" are familiar names. Recently several acres of Tahoe National Park have been devoted to raising the Washington sequoias from seedlings. The young trees are said to be flourishing, but since they will take some 20 to 40 centuries to mature, those who plant them will see only their infancy. They will form a lasting monument, indeed, to the generation that planted them. The name sequoia is taken from the name of the Cherokee chief, Sequoyah, who invented an alphabet for his tribe.

Serfs, persons a step above slaves, as they cannot be sold from the land upon which they live. Slavery existed among the Romans and the German tribes, but gradually the slave rose to the rank of the serf, while many, higher in rank, were reduced by famine and war to sell themselves as serfs, especially to the churches and monasteries. Like other elements in the feudal system, the serfs varied in the restriction of their privileges. A serf could buy his own freedom or give it by living in a town for a year and a day, and by military service. As European governments became more central and stable serfdom passed away. In England it disappeared during the 15th and 16th centuries, and it was present somewhat in France up to 1789. It was abolished in Prussia in 1807, in Austria in 1848 and in Russia in 1861.

Sergeant, *Sar' jent,* a noncommissioned military officer. Each company of coast artillery and engineers has eight sergeants, each troop of cavalry and battery of field has six, and each company of infantry has four. In the cavalry and artillery there is a first sergeant and a quartermaster-sergeant for each stable organization, appointed by the regimental or cavalry district commander upon recommendation of the company commander. The special line of duty assigned to a sergeant is often designated by a prefix, as ordnance-sergeant, one who has charge of the guns. The position of sergeant is an important one. He is the highest officer who lives in the barracks and is held responsible for discipline and order there, and for the proper dress of the men. He is also the means of communication between the captain and the men of command.

Sergeant at Arms, the officer elected by lawmaking or deliberative bodies to enforce the orders of the presiding officer, serve warrants and arrest members for disorderly conduct. In the United States Congress the sergeant at arms of the House of Representatives and the Senate are important officers. Their authority cannot be disregarded when a member receives an official notice from that source. If a member is needed in either house to complete a quorum the sergeant at arms may arrest him wherever found, and compel his appearance. When the sergeant at arms carries the mace down the aisle of either house that emblem should quell instantly any disturbance. If a member pays no heed to this demonstration he is guilty of contempt. See MACE.

Serous, *Se' rus,* Membrane, those membranes which form sacs enclosing certain organs in the human body. The

inner coat secretes a serous fluid. The chief serous membranes are the pleura, the peritoneum and the synovial membranes around the joints. Their function is to prevent friction and enable the organs to move freely. Pleurisy is a disease of the pleura, and peritonitis of the peritoneum.

Ser'pent, or **Snake,** the largest order of Reptilia, and composed of nearly 2000 species, representatives of which are found in temperate and tropical parts of the world. The different species vary in length from tiny specimens five inches long to the giant anaconda, which is said to be sometimes fully 30 ft. in length. All serpents have round, sinuous bodies with no distinction of neck, trunk or tail, no limbs, except in rare instances where rudimentary hind limbs are found, no external ears and no eyelids. In consequence of the last lack, the serpent, like its prototype, sleeps with its eyes open. To protect the eyes, however, there is a small transparent cap, like a tiny watch crystal, which is shed with the skin two or three times during the year.

The jaws of the serpent are elastic and are set in such a way as to allow the passage of animals larger than the serpent itself. The tongue is long and forked and capable of great extension; by some it is believed to be the seat of the sense of hearing, but is not, as once supposed, the repository of the venom. In poisonous serpents the venom glands are situated at the base of the fangs and act through an orifice in their points in much the same manner as a hypodermic syringe.

The bodies of serpents are covered with smooth, shining scales, which, upon the abdomen, are broad, and by expansion and contraction form the means of locomotion. Movement may be in a straight line, but is generally a succession of sinuous curves. Many serpents are aquatic, and all feed upon Rodents, insects and small fish. They often reproduce by eggs, upon which they rarely brood, but which they leave to hatch in the warm sun; in many species the young are born alive. There are 117 species of serpents found in the United States, 17 of which are poisonous; the most of these are really abundant only in the warmer parts of the country. See Anaconda; Boa Constrictor; Cobra; Copperhead; Moccasin Snake; Python; Rattlesnake.

Ser'pentine, a mineral which frequently occurs in enormous masses as rock. It is found in Switzerland, Italy, England, Ireland and the United States. Its name was suggested by its fancied resemblance to the skin of a serpent. It is composed of magnesia, silica and water, and ranges in color through various shades of green to brown or yellow. It takes a high polish, is tough, hard and easily cut; and its beauty of color renders it desirable for ornamental purposes, chiefly interior ornamentation; *verd antique,* a veined and mottled variety, is much used in this way. Asbestos, a fibrous variety of serpentine, is used in the manufacture of fireproof material. See Asbestos.

Se'rum Ther'apy, a comparatively modern method of combating disease by means of inoculation of the blood with living or dead germs of the disease or their products. The principle has long been understood that by taking small and continually increasing doses of poisons, a person may become enabled to take otherwise harmful amounts without feeling any disastrous effects. The science of serum therapy has arisen from this same principle and combats disease in two ways—as a curative and as a preventive. It acts upon the principle that in good health the blood serum is able to produce its own antitoxins for destroying disease germs, but in case the system has been weakened, the assistance of injected antitoxins is needed. These are made by preparing germ cultures of the disease and injecting their product into the body of some animal, either the horse or the cow. The serum, which this animal's blood produces to combat the disease, is then tested and, if found of the right quality, is injected into the body of a person suffering from the disease or exposed to it. Such treatment has

met with remarkable success in cases of diphtheria and smallpox and with varying results in cases of cholera, pneumonia and other bacterial diseases. Its possibilities are suggested by the effects thus far obtained, and when better understood it will probably form an even more efficacious method of preventing epidemics and disease. See VACCINATION.

Servia or **Serbia,** a European kingdom forming the principal province of Jugo-Slavia, occupying the southeastern part of that state, extending from Hungary on the north to Greece on the south, facing Bulgaria on the east and Albania on the southwest. Thus Siberia occupies almost the geographical center of the Balkan Peninsula.

THE COUNTRY. Mountains form the frontiers of Serbia on the east, south, and southwest. The Morava River and its tributaries drain the country into the Danube.

Travelers speak of the charm of Serbian scenery,—the soft blue of the distant hills, nowheres very rugged, the willow-lined rivers, the rich valleys and forest clad heights.

THE PEOPLE. The people are Slavic in ethnology. They are by inclination farmers. Their language, identical with that of the Croats, is said to be the most musical of all the Slavic tongues. All South Slavic people are poetical, music loving people and have great collections of national songs. To this fact is due the persistence of language and consciousness of unity, which survived the vicissitudes of centuries. The history of Serbia for the last thousand years lives in its songs and lullabies. They have been handed down from one generation to another, and to this day have been preserved in their pristine purity of text and melody in the souls and memories of the Serbian people.

HISTORY. Early in the fourteenth century Serbia was the most powerful country in the Balkans. Her territory extended from the Save and the Danube to the Gulf of Corinth, from the Adriatic to the frontiers of Thrace. Bulgaria was a suzerain state. Serbia seemed destined to revive the civilization of Byzantian Empire, and carry it to even greater heights. All this greatness, actual and prospective, went down to defeat when Turkey won the great battle of Kossovo, 1387. Then followed more than four centuries of Turkish misrule from which Serbia was liberated in 1817. Since then the country has made progress, but it has been won only by a constant struggle against Austrian and German diplomacy especially that of recent decades. The ambitious plans of these nations would have been frustrated by the formation of a strong Balkan state. Then came the World War of 1914, initiated by the precipitate action of Austria in declaring war on Serbia. With the downfall of Austria-Hungary, the various South Slavic people in the Balkans united with Serbia to form the state of Jugo-Slavia. (See JUGO-SLAVIA.)

Service, *Ser' vis,* **Robert W.** (1876-), a Canadian poet and novelist, born in Preston, England, and educated in the Hillhead High School, Glasgow. After graduating from high school, he entered the employment of the Commercial Bank in Glasgow. Later he came to Canada, and after traveling extensively in America, accepted a position with the Canadian Bank of Commerce. He was stationed successively at Victoria, Vancouver, Kamloops and White Horse. He has written much in poem and story of the country of his adoption and is known as the "Poet of the Yukon" and also "The Kipling of the Arctic World." His works include *Songs of a Sourdough, Ballads of a Cheechako, The Trail of '98,* a novel, and numerous contributions to the press of Canada and Scotland.

Service Berry. See JUNE BERRY.

Ser'vius Tul'lius, the sixth legendary king of Rome. He is supposed to have been the son of a slave. He married the elder Tarquin's daughter, and on the death of Tarquin succeeded to the throne. He beautified Rome, defeated the Etruscans and divided the population of Rome into tribes, instituting the comitia centuriata and the tributa.

Ses'amum, or **Sesame,** *Ses' a me,* an Arabian herb of the Bignonia Family, occasionally cultivated in southern United States but more frequently found growing wild in waste grounds. It is a low, hairy herb having rather long leaves, the upper ones uncut and the lower unequally three-lobed. The flowers are almost stemless and grow singly in the juncture of the leaf and main stems. They have small five-lobed calyx cups surrounding the rose-colored or white, tubular corollas, within which are four stamens. The fruit contains an oily, thick-coated seed much prized in Eastern countries as a food and for its oil.

Se'ton, Elizabeth Ann (1774-1821), the founder and first superior of the Sisters of Charity in the United States. She was born in New York City, but shortly after her marriage to William Magee Seton (1794) went to Italy, where they remained until his death at Pisa (1803). The following year Mrs. Seton returned to the United States and in 1805 joined the Roman Catholic Church, having become interested in that religion abroad. Three years later, with the aid of Rev. W. L. Dubourg, she founded a school for girls on a farm outside of Emmitsburg, Md., which later became a large community and adopted the rules of the Sisters of Charity. Mrs. Seton was elected mother superior three times and numerous colonies were sent to different places, so that at her death there were 20 communities located in the United States.

Seton, Ernest Thompson (1860-), a famous author, artist and naturalist, born in South Shields, England. After studying at College Institute, Toronto, he took up painting at the Royal Academy, London, England, and at the Julian Academy, Paris. He came to Canada at the age of five and lived in the backwoods until he was ten. He was naturalist to the Manitoba Government and an illustrator of the *Century Dictionary,* and is the author of *Birds of Manitoba, Wild Animals I Have Known, The Trail of the Sandhill Stag, The Biography of a Grizzly, Bird Portraits, The Birchbark Roll, Natural History of the Ten Commandments* and *Biography of a Silver Fox.* He has won a notable reputation for his stories of animal life. He has delivered over 2000 lectures.

Set'ter, a hunting dog of the spaniel type, originally called a setting dog. This name came because of its use when hunting for small game was done chiefly by means of nets; the dog was trained to creep so close to the ground that the net could be thrown from behind it without its head being entangled in the meshes. Since the days of net hunting are past, the old setter, which has been interbred with the pointer, is used for pointing game. Like the pointer it has the same extended muzzle, alert expression and vigilant pose. The shoulders are elevated, the ears long and drooping. The coat is of silky, wavy hair, which hangs in a fringe from the sides of the body, the backs of the legs and the tail. In color setters are black and white, or white with orange or liver-colored spots. This description applies particularly to the standard English setter. The Irish setter is a taller dog with more slender body. Its head is held more erect and its color is dark red or red and white, but never black. The Scotch breed, which is black and tan in color, is of heavier build and has coarse hair. This dog is sometimes called the Gordon setter. Still a fourth species, the Russian setter, has a thicker coat of woolly, matted hair.

Sev'en Days' Battles. See PENINSULA CAMPAIGN.

Seventh Day Ad'ventists. See ADVENTISTS.

Seven Weeks' War, a war waged in 1866 between Prussia on the one hand and Austria and her German allies on the other. The struggle was the culmination of Bismarck's plan for establishing a new Germany under the leadership of Prussia, and for forcing Austria out of the German Confederation. Concurrently with this war was fought another in Italy, between the Italians and Austrians. In June, 1866, Prussia declared war against Austria and began at once the invasion of Bohemia. The Prussians were everywhere victorious, and after

the great defeat of the Austrians at Sadowa, the latter sued for peace. The war ended with the Peace of Prague, signed Aug. 23. Austria consented to the dissolution of the old German Confederation and agreed to allow Prussia to reorganize the German states as she chose. Venetia was also surrendered to the Italian Kingdom.

Seven Wise Men, seven sages who lived in Greece about 620-550 B. C. Their names, as usually given, are Solon, Thales, Pittacus, Bias, Chilon, Cleobulus and Periander of Corinth. They cultivated practical wisdom, fragments of which, expressed in brief aphorisms in verse or prose, are extant. Included in their maxims are "Know thyself," "Nothing in excess" and "Consider the end."

Seven Wonders of the World, usually given as the Colossus at Rhodes, the Temple of Diana at Ephesus, the Mausoleum at Halicarnassus, the Pyramids of Egypt, the Pharos at Alexandria, the Hanging Gardens of Babylon and the Colossal Statue of Zeus at Olympia, of gold and ivory, made by Phidias. See PYRAMIDS.

Seven Years' War (1756-1763), a war between Frederick the Great of Prussia and various European powers and extending to America and India. Maria Theresa of Austria had been forced to cede Silesia to Frederick, and she won Elizabeth of Russia and Augustus III, King of Poland, as allies, in an attempt to recover this territory. The King of England sided with Prussia and this led France to favor Maria Theresa. Frederick acted quickly and in August, 1756, he invaded Saxony. France now took an active part against him and in 1757, Austria, Russia, France, Sweden and many states of the German Empire were all leagued against Frederick. The King of Prussia maintained the long struggle against fearful odds, and by his generalship and a few events fortunate for him, the war was at last brought to a close.

At the time of Frederick's greatest danger, his bitter enemy, Elizabeth of Russia, died, and her successor, Peter III, became his ally, an event which gave him a decisive advantage. He came out of the conflict triumphantly holding Silesia. England and France were pitted against each other in America and India, and France lost the greater part of her possessions in both hemispheres. England also acquired Florida from Spain, and France ceded Louisiana to Spain as a compensation. The war came to an end by the Treaty of Paris, 1763, between England, France and Austria, and by the Treaty of Hubertsburg between Prussia and Austria in the same year. SEE FRENCH AND INDIAN WARS.

Sev'ern, a river of England, the second largest in the country. It rises on Mt. Plinlimmon, in Montgomeryshire, North Wales, and flows east and southward, widening into the British Channel. It is 210 m. long, of which 180 m. are navigable. The principal tributaries are the Avon and the Wye, and canals connect it with the Mersey, Trent and Thames rivers. Near Chepstow, under the estuary of the river, is the famous Severn railway tunnel. Inundations are frequent after it passes Gloucester, when its banks become very low.

Seve'rus, Lucius Septimius (146-211), a Roman emperor, born in Africa. On the murder of Pertinax (193) he was proclaimed emperor by his legions, and after defeating his rivals became absolute ruler, and was able to leave the succession to his son. He built a stone wall in Britain from the Tyne to the Solway Firth. Soon after putting down an insurrection in the island, he died at York.

Sevier, *Se veer',* **John** (1745-1815), an American pioneer and politician, born in Rockingham County, Va., of Huguenot ancestry. He left school at 16, was married at 17 and at 19 founded Newmarket, in the Shenandoah Valley, where he won celebrity as an Indian fighter. In 1772 he moved to the Watauga settlements on the western slope of the Alleghenies. During the Revolution Sevier engaged in Indian conflicts on the frontier, distinguished himself by leading the right wing at King's Mountain, and, having served

under Marion in the Carolinas and Georgia, became brigadier-general. He was active in the revolt when, in 1784, North Carolina ceded its western lands to the United States, and though he opposed the erection of the State of Franklin in Tennessee, he became its only governor, 1785-1788. When this state dissolved he was imprisoned but soon escaped; when it was reannexed to North Carolina, he represented it in Congress. Sevier was the first governor of Tennessee, serving from 1796 to 1801 and again from 1803 to 1809. He was in Congress from 1811 to 1815. He died while on a commission to the Creeks of Georgia.

Seville, *Se vil',* a city of Spain, situated on the Guadalquivir River, 355 m. by rail s.w. of Madrid. The older quarters are Moorish in appearance, and in the suburb of Triana to the west live a great number of Gypsies. Fairs, church festivals, carnivals and bull fights are popular spectacles, when the animated streets of Seville are gay with the vivid costumes characteristic of sunny Andalusia. Among the buildings are the Cathedral of Seville, the palace of the Moorish kings, the chapel of the Catholic kings and the University of Seville. Chocolate, silk, ironware, soap and tobacco are manufactured. Population, estimated 170,000.

Sewage, *Su' aje,* **and Sewerage,** *Su' er aje.* Sewage is the term for the waste matter which flows through drains from houses, villages and cities; sewerage is the term given to the system of conduits, or pipes, by which the refuse is drained away. An adequate system of sewerage is absolutely essential for sanitary reasons. In the country where the inhabitants do not live close together, the sewage can be easily disposed of, but care should be taken that the water supply is not contaminated with it. Babylon, Jerusalem and Rome had, even in ancient times, an elaborate system of sewers, but it is only within comparatively recent times that the disposal of sewage has received proper attention in our modern communities. Two systems are employed, the separate and the combined. In the separate system, known as the Waring, there are separate conduits for the storm water, or surface drainage, and the sewage; while in the combined system, the same sewers and conduits carry both the sewage and the storm water. In the former system, the flushing of the pipes is done from tanks supplied with water by the city waterworks. This system is more sanitary and is, therefore, the one recommended by engineers.

The following methods of sewage disposal are employed: by dilution with flowing water and discharging the mass into streams, a method used by New York City, Boston and Chicago, and by towns on the lower Mississippi; by broad irrigation, or sewage farming, where the liquid sewage is run over a large area of land and left to oxidize in the air; by chemical filtration and treatment, so as to kill all organic life and make the solid matter, or sludge, available as a fertilizing material. See IRRIGATION; DRAINAGE; WATERWORKS.

Seward, *Su' ard,* **William Henry** (1801-1872), an American statesman, born in Florida, N. Y., and educated at Union College. He began to practice law in Auburn in 1823 and soon gained a high reputation, especially in criminal cases, but, drifting into politics, was a member of the New York Senate from 1830 to 1834 and as a Whig leader opposed the Jackson administration. From 1838 to 1842 he was governor of New York, when he resumed his practice, gaining an extensive business chiefly in the United States courts. Having served as national senator from 1849 to 1861, he was meanwhile the adviser of President Taylor; a conspicuous opposer of slavery, fighting eloquently the compromise acts of 1850 and the Kansas-Nebraska Bill of 1854; a founder of the Republican Party; and, in 1860, a leading candidate for the presidency. He was defeated in the convention by Abraham Lincoln, whereupon he worked for the election of Lincoln, who called him to his cabinet as secretary of state.

In this office Seward conducted the foreign affairs of the government, espe-

cially through the Civil War, with marked sagacity, continuing in the same post in President Johnson's cabinet until 1869. Among the important subjects of his diplomacy were the liberation of Mason and Slidell (See TRENT AFFAIR), the adjustment of the Alabama Claims (See ALABAMA CLAIMS), the withdrawal of the French from Mexico and the purchase of Alaska from Russia. On the evening of Lincoln's assassination, Apr. 14, 1865, Seward received dangerous wounds, from the shock of which he never fully recovered. Upon retiring from public life, in March, 1869, he traveled until his death. Seward's writings include a *Life of John Quincy Adams* and an *Autobiography.*

Sewellel, *See wel' el,* a Western Rodent of the Rat Family, found chiefly in the neighborhood of the Columbia River. It is about the size of a rabbit, has soft, brown fur, a short tail and round, bright eyes. Its chief food is vegetables or young shoots and leaves of saplings. The fur is valued by the Indians.

Sewing, Machine, a machine for sewing or stitching, the needle carrying the thread being operated by a mechanical device instead of by hand. The eye of the needle is near the point, which is pushed through the fabric, carrying with it a loop of the thread. Sometimes a single thread is used, and then the loop of each stitch passes through and, by means of a hook, secures the loop of the previous stitch, something like the stitch in knitting. This is called the chain stitch. In the lock stitch a shuttle carrying another thread in a bobbin is used, which passes through the loop held by the needle, and secures it, making the seam less likely to unravel.

The first invention of a sewing machine was made by a German named Weisenthal, in 1755, who used a double-pointed needle with the eye in the center, with two pairs of clinching bars, or pinchers, which alternately seized the needle and passed it back and forth through the fabric. Although Elias Howe was not the original inventor of the sewing machine, yet his invention of the lock stitch, in combination with a needle having the eye near the point, together with his other devices, made the sewing machine practical, and a patent was granted to him in 1846. In the earlier development of the sewing machine, associated with the name of Howe are those of Bachelder, Wilson and Singer, each of whom took out patents for various improvements, such as the automatic feed, the overhanging arm, by which the needle is pushed through the fabric, and the foot treadle to propel the mechanism. When the manufacturers of sewing machines combined, they paid Howe royalties amounting to nearly $2,000,000. Isaac M. Singer invented a machine that made the chain stitch. Allan B. Wilson invented the rotary hook, with a circular bobbin used in the Wheeler and Wilson machine. Innumerable improvements and modifications have been made from time to time on the sewing machine, making it useful for sewing buttonholes, stitching shoes, sewing gloves, making leather satchels, mail bags and harness, as well as for sewing various fabrics and for darning.

The United States excels in the manufacture of sewing machines, and it has been estimated that nearly $100,000,000 worth have been sold abroad in competition with those of English, French and German manufacture.

Sex'tant, an instrument employed in making observations for the purpose of surveying land, and used at sea for measuring the angular distances of objects. It has replaced the quadrant for nautical observations on account of its smaller size; and for land surveying, an instrument carrying a whole circle is now used. The sextant is made with a frame of brass, having an arc of 60°, with two reflecting mirrors, one silvered entirely and the other silvered over half its surface, with an eyepiece, a movable arm to carry the fully silvered mirror and a vernier; also a graduated scale of degrees, minutes and seconds. In Figure 1, 1 is a plain mirror with the polished side turned downward; 2 is a plate of pol-

ished glass through which the eye at 3 may view a distant object in the direction of 4. Light coming from 5 and 6 and falling on the mirror, 1, will, if the mirror is placed at the proper angle, be reflected to 2. Some of it will be reflected by 2 to 3, so that the observer at 3 will see both objects 4 and 5 or 4 and 6 in coincidence.

If the mirror and plate glass are set so that their surfaces are parallel, the rays 4-3 and 5-1 are parallel and may be considered as coming from the same object at an infinite distance. The eye will see two images in the mirror together, but if the mirror is moved in a different direction, the angle of reflection will be changed and the ray 6-1 will diverge from the ray 5-1 in their reflection to 2, by double the angle through which the mirror was turned. Therefore if the observer can measure the angle between the mirror and the glass plate, doubling this angle will give him the difference in direction between the rays coming from 4 and 6. The sextant is used to measure this angle.

Figure 2 shows the parts of a sextant mounted in a frame. The part 1, 2, 3 consists of an arc 1-2 graduated in de-

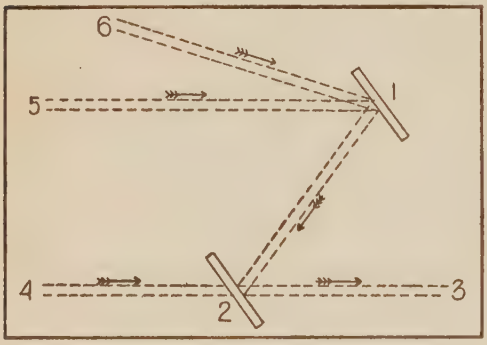


FIGURE 1

grees and held to 1 as a center by two radii. To one of these is attached the plate of glass 5, the lower half of which is silvered and the upper half transparent. To the other radius is attached the telescope 4. A B is a movable arm which revolves around 1 as a center. The observer holds the spectroscope in his hand in a vertical position so that the telescope is horizontal. Facing the vertical plane of the object he wishes to measure, he turns the movable arm until he brings that object into sight in the mirror. When this object has been made to coincide with the horizon, the angle through which the arm A B has moved is deter-

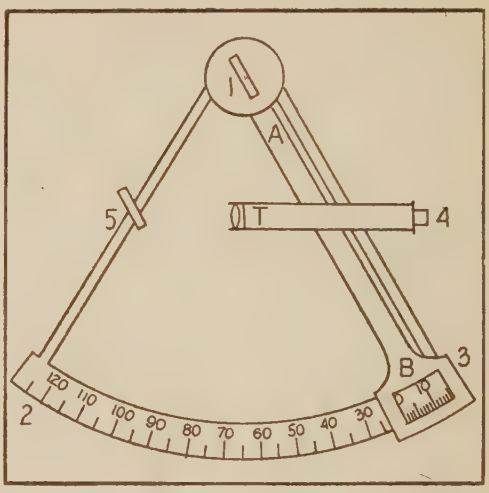


FIGURE 2

mined. The sextant was originally designed by Sir Isaac Newton in 1672, but many improvements have been made since then. It is used chiefly at sea for measuring the altitudes of the heavenly bodies and their angular distances, in this way determining latitude.

Seychelles, *Sā″ shel′,* **Islands,** a group of about 90 small islands lying in the Indian Ocean 750 m. n.e. of Madagascar, of which they are probably a continuation. The largest of the group has an area of 56 sq. m. All are of volcanic formation and are mountainous, though generally fertile. Coffee, coconuts, sugar, rice, cocoa and vanilla are produced. The chief city is Port Victoria, located upon Mahé. The Seychelles are a possession of Great Britain. Population, 26,000.

Seymour, *Sē′ more,* **Horatio** (1810-1886), an American statesman, born in Pompey, Onondaga Co., N. Y. He was educated at Geneva Academy and at a military school and, having been admitted to the bar, served in the New York

Legislature during three terms. In 1852 he became Democratic governor of New York. He at first favored compromise on the slavery issue but later decided for the maintenance of the union, though criticizing Lincoln's war policy. He was nominated for the presidency in 1868, but was defeated by Grant.

Shack'leton, Sir Ernest (1874-), a British naval officer and Antarctic explorer, born in Kilkee, Ireland. He was second in command of the British Antarctic expedition under Capt. R. F. Scott, 1901-1904. He organized and commanded the Antarctic expedition of 1907-1909. One division under Shackleton made a sledge dash for the South Pole, reaching a point 97 m. from the pole, where they were obliged to turn back from lack of supplies. He discovered that a vast body of land or Antarctic Continent surrounds the South Pole, rising to a lofty plateau 11,000 ft. above sea level at the pole, traversed by a mountain range. The other division located the South Magnetic Pole at 72° 25′ S. lat. and 155° 16′ E. long., and measured Mt. Erebus,—13,300 ft.

In 1914-1916 Shackleton led another Antarctic expedition, the object of which was to cross the polar area from Waddell Sea to Ross Sea, but the expedition proved a failure, owing to their ship being caught in the ice and sunk. The expedition sailed from South Georgia in December, 1914, and discovered new land 1200 m. distant, which Shackleton named Paird Coast. Here their ship *Endeavor* was caught in the ice, and on November 20, 1915, was sunk, all on board escaping to the ice with 100 cases of food. Shackleton and five volunteers sailed in open boat for South Georgia for help. After three unsuccessful attempts at rescue, the fourth attempt from Punta Arenas was successful, and brought off the 22 men, safely, reaching Punta Arenas August 20, 1916. He has published *The Heart of the Antarctic.* (Z. A. D.) See POLAR EXPLORATIONS; ANTARCTIC REGION.

Shad, a food fish of the Herring Family. All species of shad have rounding, compressed bodies, a single dorsal fin, large scales and a forked tail. The lower jaw projects and gives the head a ferocious appearance. Although not at all valued in England, in France and America the shad has considerable commercial importance and has been successfully propagated by the United States Fish Commission in streams of the Mississippi Valley. Locally the name is often wrongfully applied to the crappie, the Spanish mackerel, the menhaden and the alewife.

Shad'bush". See JUNE BERRY.

Shad'dock. See GRAPEFRUIT.

Shaf'ter, William Rufus (1835-1906), an American soldier, born at Galesburg, Mich. Reared on a farm and with only a common-school education, he entered the Seventh Michigan Infantry as first lieutenant in August, 1861, and by March, 1865, he had been brevetted brigadier-general of volunteers. In May, 1897, he was commissioned brigadier-general in the regular army, and at the outbreak of the Spanish-American War was selected to command the military operations in Cuba, which resulted in the surrender of Santiago, July, 1898. Later he commanded the Department of the East and the Department of the Pacific, retiring in 1901, with the rank of major-general.

Shaftesbury, *Shafts' ber y,* **Anthony Ashley Cooper,** FIRST EARL OF (1621-1683), an English statesman. He represented Tewkesbury in the Short Parliament in 1640, and, after having at first supported Charles I in the Civil War, joined the Parliamentary cause. He was prominent in the Protectorate under Cromwell, but later worked to overthrow the second Protectorate and was a commissioner to Breda to invite the return of Charles II. By Charles II he was made governor of the Isle of Wight, chancellor of the exchequer and a privy councilor. Later he was created first Baron Ashley, was a commissioner for the trial of the regicides, became Earl of Shaftesbury and was made lord chancellor in 1672. The next year he lost his office because of his persecution of the

Catholics, and became leader of the Opposition in Parliament. In 1679 he became a member of the Council and was instrumental in securing the passage of the Habeas Corpus Act. He conspired to place the Duke of Monmouth on the throne, and this and acts considered disloyal led to his arrest and imprisonment in the Tower of London. He was soon released, but continued his disloyal acts until compelled to flee to Holland, where he died.

Shagreen', a sort of leather produced originally by Oriental people from the hide of the ox, camel, horse or ass; sometimes the skins of the shark, sea otter and seal were used. The seeds of a species of goosefoot are embedded in the skin when it is made soft by soaking; afterwards the skins are shaved and dried. When the seeds are removed, they leave irregular surfaces on the skin, which are made more so by washing in salt. The skins are then dyed in various colors, green being the favorite one. When the leather is properly tanned, it makes an excellent covering for books, and is also used in upholstery, while the cheaper grades are employed to cover instrument cases, photographic cameras and similar objects.

Sha'kers, the name generally applied to the members of the Millennial Church. This is a society of believers in communism, with branches in New England, Ohio, Kentucky, Georgia and Florida. They state that they were originally a Quaker sect, being termed Shaking Quakers because of the bodily movements they made in religious meetings. They were organized in England about 1747 and appeared in America in 1774, when Ann Lee, an expelled Quaker of Manchester, England, established a small church near Watervliet, N. Y. The Shakers live in communities divided into groups, or families, where all property is held in common, and both sexes participate in the labor and administration of the organization. Celibacy is enjoined on all, so that married persons who join their society must live as brother and sister. They live plainly, healthfully and simply, paying much attention to hygiene, and are thrifty and capable, deriving their income from farming, small manufactures and the education of children. In their religious services they worship no person, but "the highest good, wherever it may be found." The Shakers were the first to establish a communistic settlement in the United States. Their oldest and largest settlement is located at Mt. Lebanon, N. Y. They are now estimated to number about 1000.

Shakespeare, *Shake' speer,* **William** (1564-1616), the foremost English poet and dramatist and one of the world's great poets, born at Stratford-on-Avon. He was the third child and eldest son of John Shakespeare and Mary Arden. The father was a glover by trade and a man of some importance in the village, but of lower station than the mother of the poet, who came from a good old Warwickshire family.

SHAKESPEARE'S LIFE. Until he was about 14 Shakespeare attended the free grammar school of Stratford, learning chiefly Latin, writing and arithmetic, but that deep and sure insight into nature and the acquaintance with the folk lore of his native region, which his works reveal, must have come from many boyhood rambles. Occasionally, traveling companies of actors came to Stratford and the poet's first impressions of the stage were probably gained during these early years. About 1578 John Shakespeare began to suffer reverses of fortune and his son had to leave school. Four years later the youth was married to Anne Hathaway, a woman eight years older than himself, and by 1585 three children had been born to them, Susanna and the twins, Hamnet and Judith. Some time between 1585 and 1587 Shakespeare left Stratford to seek his fortunes in London; tradition says, to escape the results of a deer-poaching escapade on the estates of Sir Thomas Lucy.

Of the details of the first few years of Shakespeare's life in London, nothing is known, but that he early became connected with the theater is clear from a reference made in 1592 by the dramatist

Robert Greene, in a bitter exhortation to Marlowe, Peele and other dramatists: "..an upstart Crow, beautified with our feathers, that with his Tygers heart wrapt in a Players hide supposes he is as well able to bombast out a blanke verse as the best of you.....in his owne conceit the onely Shake-scene in a countrie." It is probable that by this time Shakespeare was an actor of some prominence and had already begun his literary career by revising old plays. The next certain date is 1593, when he published the poem *Venus and Adonis,* with a dedication to the Earl of Southampton. The next year his *Rape of Lucrece* was dedicated to the same patron, and there has come down to us a story that the Earl at one time gave the talented young poet £1000 ($5000), to complete some purchase which he had under consideration.

A large part of Shakespeare's external life is wrapped in mystery, but a few authentic dates throw some light on his history. In 1596 his son Hamnet died. Indicative of his increasing prosperity through his work as actor and playwright, is the record of his purchase in 1597 of New Place, the largest house in Stratford, while in 1599 he and his father succeeded in procuring a coat of arms. The same year he became a shareholder in the Globe Theater, in 1602 he bought 107 acres of land in Old Stratford Parish, and in 1610 added to them 20 acres. This material prosperity furnishes a striking contrast to the poverty of such fellow dramatists as Greene, Marlowe, Nash and Peele. About 1611 Shakespeare retired to Stratford, which he made his home for the rest of his life, making, however, occasional trips to London until about 1615. He died Apr. 23, 1616, of a fever, so the story goes, contracted at a "merry meeting" in the Stratford tavern, where he was entertaining Jonson and Drayton. His daughters received the bulk of the property, the widow being willed the "second best bed, with the furniture." Thousands of tourists each year visit his grave in Stratford and read the quaint inscription on the slab above it:

Good frend for Jesus sake forbeare
To digg the dust encloased heare;
Bleste be the man that spares thes stones,
And curst be he that moves my bones.

The Plays and Sonnets. The first published collection of Shakespeare's plays was issued in 1623 in a volume known as the First Folio. Inasmuch as this edition does not give the dates at which the plays contained in it were written or produced, these dates can be assigned with only approximate accuracy. Shakespeare's career as a dramatist, however, shows four distinct stages. The first period, which he began by retouching old plays, was one of experiment and apprenticeship. To it belong: *Love's Labour's Lost* (1590); *The Comedy of Errors* (1590-1); *Two Gentlemen of Verona* (1591-2); *Henry VI,* Parts II and III (1592); *Richard III* (1593); *Richard II* (1593-4). *Titus Andronicus* and Part I of *Henry VI,* also of this period, are thought to have been merely retouched by him. The plays of the second period, which was one of sure and rapid development, are marked by increasing actuality, power of character portrayal and, above all, by humor. These plays are: *Romeo and Juliet* (1594); *King John* (1594-5); *The Merchant of Venice* (1594-5); *A Midsummer Night's Dream* (1593-6); *The Taming of the Shrew* (1595-6); *Henry IV,* Part I, (1596-7); *Henry IV,* Part II (1597-8); *Henry V* (1598-9); *The Merry Wives of Windsor* (1599); *As You Like It* (1599); *Much Ado About Nothing* (1599-1600); *Twelfth Night* (1600-1).

The plays of the third period, the period of maturity, show an abrupt transition to darker themes. These plays fall into three groups: the Roman plays, *Julius Cæsar* (1601), *Antony and Cleopatra* (1608) and *Coriolanus* (1609); the comedies, *All's Well That Ends Well* (1601); *Troilus and Cressida* (1603) and *Measure for Measure* (1603-4); the tragedies, *Hamlet* (1602), *Othello* (1604), *Macbeth* (1605-6) and *King Lear* (1606). *Timon of Athens* (1607-8) is also included in this group, though it is probably not entirely Shakespeare's.

In these plays the dramatist portrays the depths of human sin and suffering, rises to his greatest heights of genius and reveals himself as the poet of universal humanity. The plays of the closing period, pure romances, are characterized by serenity, delicacy and a tender musing. In *The Tempest,* probably his last complete play, and a fitting farewell to his art, all the poet's wonderful powers come into full play, "silvered down into exquisite harmony." The last plays are: *Cymbeline* (1609); *A Winter's Tale* (1610); *The Tempest* (1611). To this group also belong three plays of which he wrote a part: *Pericles* (1608); *The Two Noble Kinsman* (1613); *Henry VIII* (1613).

Of Shakespeare's nondramatic writings the *Sonnets,* published in 1609, have occasioned the most comment and discussion. They are addressed to "a man right fair" and a "woman colored ill." Whether the poems are a personal expression of the great writer's experiences is an absorbing question which perhaps can never be satisfactorily answered. The *Sonnets,* however, rank among the enduring works in English literature.

Literary Qualities. The most striking characteristic of Shakespeare is the almost miraculous power and richness of his mind. There was no phase of human experience or emotion that his art could not encompass, nor any quality of language beyond his range. A second characteristic that has attracted much attention is the impersonality of his writings. No other great writer has ever presented characters so detached from his own personality or revealed so little of himself in his work. His writings, however, show clearly that his attitude toward life was sane and that he believed in simple and wholesome morality. He was not a fatalist. Almost without exception his tragic characters come to their ruin through their own weakness or baseness, not because of external circumstances.

The pride, love and reverence with which the present age regards Shakespeare's name frequently obscure his faults. The most obvious of these are an abuse of language in the matter of wordplay, figure, etc., careless handling of plot and disregard of plausibility. These defects arise from Shakespeare's purpose to write for the theater of his day, not from a deficiency in artistic sense. He was a great artist, but he lacked the self-restraint of the conscious artist who belongs to a more critical age. When all is said, however, his achievement must continue to astonish the reading world.

Personal Qualities. Of Shakespeare's personal character we have some hint in contemporary reference. The word *gentle,* applied to him most frequently by his friends, suggests unusual personal charm. Of those who knew the great poet intimately, however, none expressed more sincere affection than his fellow dramatist, Ben Jonson, a man too sensible to give way to exaggeration, who said in an eulogy, which was written for the First Folio edition of Shakespeare's plays: "I loved the man and do honor to his memory, on this side idolatry, as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions and gentle expressions."

Others abide our question. Thou art free.
We ask and ask: Thou smilest and art still,
Out-topping knowledge. For the loftiest hill
That to the stars uncrowns his majesty,
Planting his steadfast footsteps in the sea,
Making the heaven of heavens his dwelling place,
Spares but the cloudy border of his base
To the foiled searching of mortality:
And thou, who didst the stars and sunbeams know,
Self-schooled, self-scanned, self-honored, self-secure,
Didst treat on earth unguessed at. Better so!
All pains the immortal spirit must endure,
All weakness that impairs, all griefs that bow,
Find their sole voice in that victorious brow.
—*Matthew Arnold.*

Shale, a rock formed from solidified mud, containing a large proportion of clay. It splits easily into thin layers parallel with the base, the fracture often taking the form of a shallow depression. Shales may be composed purely of clay, but usually contain more or less silica, lime or carbonaceous matter in combination with the clay. Some shales containing iron oxide are useful in the manufac-

ture of brick; others containing a high percentage of lime carbonate constitute a valuable ingredient of Portland cement, while those rich in bitumen may be used in the manufacture of illuminating oil and gas. Shales containing a large proportion of iron sulphide are employed in the manufacture of alum and are known as alum shales. Many shales, when ground and mixed with water are as plastic as surface clays and are valuable for pottery.

Sha'ler, Nathaniel Southgate (1841-1906), an American geologist and educator, born in Newport, Ky., and educated at the Lawrence Scientific School of Harvard. Having served for two years as artillery officer in the Federal army, he was successively science assistant and professor of zoology at Harvard and dean at the Lawrence Scientific School. Meanwhile he was associated with various geological surveys. He wrote *First Book in Zoology, Kentucky* (in the American Commonwealths Series), *The United States of America* and *Outlines of the Earth's History.*

Shamo'kin, Pa., a city of Northumberland Co., 19 m. s.e. of Sunbury and 40 m. n.e. of Harrisburg, the capital of the state, on the Philadelphia & Reading and the Pennsylvania railroads. It is the commercial and industrial center of a region rich in anthracite and was settled in 1835 by people employed in developing the coal mines. The chief industrial establishments are foundries, machine shops, flour, planing and knitting mills, brick and powder works and manufactories of silks, shirts and hosiery. The borough was incorporated in 1864. Population in 1920, 21,204.

Sham'rock, or **White Clover,** a creeping herb of the Pulse, or Pea, Family, common in North America. It has many soft, hairy stems arising from the same root and spreading in all directions. The leaves are long-stemmed and are made up of three leaflets which, at night, fold downward along the midrib in a drooping fashion. In color they are a beautiful blue-green with a gray-white inverted V near the base. The flowers are tubular and collected in a rounding head and are well-known to everyone. This shamrock is more familiarly known in the United States as white clover and is common in dooryards, roadsides and meadows and makes excellent pasturage. The true shamrock is this same plant or a closely allied species. It is the national emblem of Ireland and is said to have been so chosen because St. Patrick, the patron saint, chose its leaf of three leaflets to represent the Trinity, three in one.

Wood sorrel, a member of the Wood Sorrel Family, is by some thought to be the true shamrock and when grown indoors is generally called by that name. Its claim to that title, however, is chiefly due to its leaves, which closely resemble those of the clover but differ in being a smoother, lighter green and having a notched apex. See Wood Sorrel.

Shanghai, *Shahng' hi',* a seaport of China in the Province of Kiangsu, situated on the Hwangp'u River. A wall 24 ft. high surrounds the Chinese part of the city, which possesses neither cleanliness nor architectural beauty. Beyond the walls to the west stretches a productive plain, yielding rice and tea, and these products together with silk are the chief exports. The northeastern portion of Shanghai is a foreign settlement, occupied chiefly by British, Americans and French. Here are found all the modern conveniences of electric lighting, paved streets and comfortable, sanitary homes. Among the prominent buildings of Shanghai are the Cathedral, a clubhouse, hospitals and municipal offices. Not only is it important in point of trade, but the city is fast developing into a manufacturing center of note. Cotton mills supply a steadily increasing demand for yarn, and large amounts of raw cotton have been supplied for Japanese mills. Reeling silk from cocoons by machinery has supplanted native methods. Other industries include establishments for building, docking and repairing ships, as well as factories for the manufacture of matches, rice, paper, ice, cigarettes and furniture. The foreign settlement is self-governing, and contains large numbers

of Chinese, though originally intended only for foreign merchants. Total native and foreign population in 1910, estimated at 651,000.

Shan'non and Ches'apeake, Battle of the, during the War of 1812, off Boston Harbor, a duel to which Captain Broke of the British frigate *Shannon* challenged Captain Lawrence of the *Chesapeake,* June 1, 1813. The struggle between the raw American and the trained English was short but fierce, the *Chesapeake* being soon partly disabled and Lawrence receiving a mortal wound. "Don't give up the ship," was his cry on being carried below, and this became a slogan to his countrymen. Having boarded the *Chesapeake,* the British took her as a prize to Halifax, her captain dying on the way. The *Shannon* lost 83 men killed and wounded; the *Chesapeake,* 146. This was the first English naval victory of importance in the War of 1812.

Shantung, *Shahng toong',* a province on the east coast of China, the eastern part of which is a mountainous peninsula projecting into the Yellow Sea. On the Shantung promontory is the district of Kiao-chau, which China, under compulsion, leased to Germany in 1898. In 1914 Japan, as an ally of Great Britain, seized the district, including the port of Tsing-tau, and in 1915 the Japanese government obtained from China all mining and railway privileges in Shantung which Germany had previously enjoyed. These rights were retained by Japan at the close of the World War, and caused much friction at the Peace Conference and bitter feeling in China. Japan has promised to return the province to China. Area, 55,970 sq. m. Population, 38,247,000.

Shark, a family of marine fishes related to the Rayfish Family and found most widely in warm seas. The sharks, of which there are many species, are somewhat spindle-shaped and have large gills on the sides of their rounding bodies; thus they are easily distinguished from the rayfishes, which are flat in form. The Shark Family includes the largest-known fish, some being from 30 to 40 ft. long, and even larger extinct genera being known.

The skin is tough and mottled; its color is usually a dull gray, and its roughness is such that it is used in making a sort of sandpaper. The tail has two unequal flukes, and the snout is so long that the mouth seems to lie far under the body. The shark is a greedy fish with an insatiable appetite, and although its chief food is shellfish, it feeds upon almost any kind of fish and is even dangerous to man. The man-eating, or white, shark of the Mediterranean is the one chiefly feared, and its many huge teeth are sufficient cause for terror. The flesh of the shark is coarse and is rarely eaten, but an oil extracted from its liver is used as a lubricant. The hammerhead shark is so named because of the peculiar extension of its cheeks which makes them look like the head of a mallet.

Shar'on, Pa., a city of Mercer Co. 40 m. s.w. of Meadville and 75 m. n.w. of Pittsburgh, on the Shenango River near the Ohio boundary, and on the Erie, the Pennsylvania and the Lake Shore & Michigan Southern railroads. The Hall Institute (Baptist) is located here. Sharon is noted for its steel and iron interests and has a considerable trade in coal. The stone quarries in the vicinity also add to the prosperity of the borough. There are boiler and machine shops, rolling and flour mills, furnaces, and manufactories of explosives, nails, horse collars, spokes, chains, stoves and furniture. The town was settled in 1795 and incorporated as a borough in 1841. Population in 1920, 21,747.

Shaw, Albert (1857-), an American editor, born in Butler County, Ohio, and educated at Grinnell College, Johns Hopkins University and in Europe. He was editor of the Minneapolis *Tribune* from 1883 to 1888, and from 1889 to 1890, and the following year he established the *American Review of Reviews,* which he has since edited. He has lectured in many universities and colleges, was awarded the John Marshall prize by Johns Hopkins, 1895, for books on mu-

nicipal government, and has written *Icaria—A Chapter in the History of Communism, Municipal Government in Great Britain* and *Municipal Government in Continental Europe.* Moreover, he is the editor of various periodicals and the author of many magazine articles on political, scientific, economical and municipal subjects.

Shaw, George Bernard (1856-), an English dramatist, critic and essayist, born in Dublin. His family removed to London in 1876 and he soon became recognized because of his brilliant and satiric writings. In politics he advocated socialistic ideas, joined the Fabian Society in 1884 and distinguished himself as a street orator and pamphleteer. Among his novels, which were rather mediocre, are *Cashel Byron's Profession* and *An Unsocial Socialist.* His plays, which followed, aroused much discussion because of their originality and the daring of his attacks. He contributed critical essays to the *Star,* the *World* and the *Saturday Review,* also to the series of *Fabian Essays* which he edited, and published *The Quintessence of Ibsenism* and *The Perfect Wagnerite.* His plays, staged both in London and New York, have provoked extensive comment, but many have enjoyed enduring popularity. They embrace *Arms and The Man, The Philanderer, Mrs. Warren's Profession, Candida, The Man of Destiny, You Never Can Tell, The Devil's Disciple, Cæsar and Cleopatra, Captain Brassbound's Conversion, The Admirable Bashville, Major Barbara, Man and Superman, John Bull's Other Island, The Doctor's Dilemma, How He Lied to Her Husband, Getting Married, The Showing-up of Blanco Posnet, Misalliance* and *Fanny's First Play.*

Shaw, Henry Wheeler (1818-1885), an American humorist, better known as Josh Billings, born in Lanesborough, Mass. He studied at Hamilton College for a while, but soon went West, where he remained for 22 years, working as a deck hand on an Ohio River steamboat, farming and auctioneering. After settling in Poughkeepsie, N. Y., he soon published his humorous *Essa on the Muel bi Josh Billings* in a New York paper. Other sketches done in an amusing phonetic spelling followed. His lectures, in which he affected awkwardness, increased his popularity. In all his work the best feature was its unstudied witticisms. From 1870 to 1880 he published annually his *Farmers' Allminax,* which had a wide sale. His lectures include *Milk, Hobby Horse, The Pensive Cockroach* and *What I kno about Hotels;* his writings, *Josh Billings: His Sayings; Josh Billings on Ice; Everybody's Friend; Josh Billings: His Works, Complete; Trump Kards; Old Probabilities; Josh Billings' Spice-Box;* and *Josh Billings' Old Farmers' Allminax.*

Shawl, an outer garment made in the shape of a square or double square. It is worn chiefly by women, but sometimes by men. The finest shawls in the world are those of India, which are made on hand looms from the inner wool of the Cashmere goat. They are woven or embroidered in beautiful patterns which have been used for centuries. These shawls have been successfully imitated by the weavers of Europe, and some of them, notably those of Paisley, Scotland, rival the originals and are much lower in price. The *plaids* of the Scottish Highlanders have given the name plaid to all patterns of similar color. A fine crape shawl is made by the Chinese, and another, which is highly valued, is the woolen Baréges shawl of France.

Shawnee', a tribe of North American Indians of the Algonquian family. They were a wandering tribe and were found in Wisconsin and South Carolina. Later they were driven north to New York and south to Florida. They fought against the Americans in the Revolutionary War and in the War of 1812. Later they went to Kansas and from there to Oklahoma.

Shawnee, Okla., a city of Pottawatomie Co., about 38 m. s.e. of Oklahoma City and 4 m. n. of Tecumseh, on the North Fork of the Canadian River and on the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the

Missouri, Kansas & Texas and other railroads. Interurban electric lines connect it with places in the vicinity. The city is situated in a rich agricultural region, of which cotton, potatoes and alfalfa are important crops, and is a shipping point for these products. It is also a center for trade in mules. Among the industrial plants are railway shops, cotton gins and compresses and cottonseed-oil presses. Cotton goods, brick, flour and lumber are manufactured. First settled in 1895, Shawnee was incorporated in the following year. Population in 1920, 15,348.

Shays's Rebellion, an insurrection in Massachusetts, 1786-1787, resulting from the economic distress which followed the close of the Revolution, and from discontent with taxes and laws. The insurgents were led by Daniel Shays, a former captain of the Continental army. They gathered at Springfield in September, forced the Supreme Court to adjourn, attempted to capture arsenals and destroyed public and private property. In January the 2000 malcontents were dispersed, with difficulty, by 4000 state militia under Gen. Benjamin Lincoln. Fourteen of the leaders were convicted of treason and sentenced to death, but Governor John Hancock later pardoned them.

Shea, *Shay,* **John Gilmary** (1824-1892), an American historian, born in New York City. He studied law and was admitted to the bar in 1846; the following year, however, he entered the novitiate of the Society of Jesus at Fordham, remaining here until 1852. He then left the society and began a systematic study of the early Catholic missions in America, producing, in 1852, the works entitled *Discovery of the Mississippi Valley* and *History of the Catholic Missions Among the Indian Tribes of the United States.* Later he published numerous other volumes dealing with the early voyages and adventures of American explorers, besides school histories and various religious writings. He was regarded as a leading authority on the subject of the American Indian. From 1888 until his death he edited the *Catholic News,* and he was honored by several Catholic institutions of learning.

Shears, *Sheerz,* an instrument for cutting fabric, leather, cardboard, paper and sheet metal. In its simplest form a pair of shears has two blades, joined by a bolt or rivet, upon which they are hinged, and operated by two handles made by extending the blades. In order to cut, it is necessary to have the material between the cutting edges of both blades. Small shears are known as scissors, of which there are a variety of shapes and patterns, such as buttonhole scissors, pocket scissors, embroidery scissors and nail scissors, as well as those for surgical uses. Large shears are used by tailors for cutting heavy cloth. Those used by tinsmiths are called snips, and when they are operated by foot or other power, they are arranged with a straight edge and called squaring shears. Bench shears have the bottom blade fastened to a bench. Pruning shears and those used in shearing sheep are usually in one piece, the blades being joined by a loop forming a spring, which causes the blades to remain open. They are closed on the wool or plant by pressure of the hand. Machine shears for cutting boiler plates and heavy sheet steel are provided with gearing, a heavy balance wheel and levers, so as to get a great deal of power, and are usually driven by steam, electric motors or gasoline engines.

Sheboy'gan, Wis., the county seat of Sheboygan Co., on Lake Michigan and on the Chicago & North Western Railway, 52 m. n. of Milwaukee and 43 m. e. of Fond du Lac. The industrial plants include foundries and machine shops, bottling works, tanneries and factories for the manufacture of furniture, carriages, enameled ware and other products. The city is an important shipping point, and large warehouses are located here. Sheboygan is the site of the county hospital for the insane, of a home for the friendless and of St. Nicholas Hospital. The city has a public library, a Federal Building and two parks. It was settled in 1836, incorporated as a village

RAW MATERIAL OF SUPERIOR QUALITY

PRIZE MERINO EWE AND RAM

HAMPSHIRE DOWN LAMBS

in 1846 and chartered as a city in 1853. Population in 1920, 30,955.

Sheep, a valuable animal of the Bovine Family, many species of which have long been domesticated. All mountainous regions have their wild forms, of which the bighorns and Rocky Mountain sheep are conspicuous American examples. These last-named species, though readily domesticated, are not the founders of the American flocks, for sheep were brought to the Western Hemisphere by Columbus before the American mountain sheep were known to exist. See BIGHORN.

Sheep are raised for their wool and for their flesh, both of which are valuable products. There are four main classes of domestic sheep. The horned varieties, less removed from the wild breeds than the others, are represented by the Dorsets, with their fine-textured fleece, medium wool and coiled horns, borne by both sexes; and by the Merinos, a Spanish breed, noted for their fine white wool and the excellent quality of the fleece. The second class, the hornless, coarser-wooled species, is represented by the Southdowns, famous mutton producers; the white-faced Leicesters, with long, fine fleece; the heavy Lincolns, with their large, bold heads; the Cotswolds, valued for crossbreeding; and the Shropshires, which are a black-faced breed, extensively raised. The third class includes the fat-tailed sheep of Australia, whose tails often accumulate fat until they weigh from 40 to 50 lb.; and the fourth includes a number of minor strains of Northern, hardy breeds. The chief things desired by sheep breeders and sought for in the improvement of species are the length and fineness of the wool, the power of fat accumulation and the quality of the flesh.

The process of improvement and of domestication of sheep is neither long nor difficult, and were the domesticated sheep exterminated, the breeds could soon be restored, and that without great difficulty, from the present wild species. According to the grade of wool produced, sheep are divided into three groups: those producing coarse wool, those producing wool of medium coarseness and those producing fine wool. The Cotswolds are a good illustration of the first; the Southdowns, of the second; and the Merinos, of the third class.

The most important sheep-raising countries of the world are, in order: Australasia, Argentina, European Russia, United States, the United Kingdom, British South Africa and Uruguay. According to recent authorities the number of sheep in the world is divided as follows: North America, 58,623,834; South America, 99,592,967; Europe, 183,901,261; Asia, 92,848,787; Africa, 50,293,014; Oceania, 116,050,409. See MUTTON; ASTRAKAN; WOOL, MANUFACTURE OF.

Sheep Tick, a name applied to two widely differing forms of animal life. One of these is a family of the order Arachnida, whose members resemble the cattle tick (See TICK). The better-known form constitutes a family of wingless insects of the order Diptera. Their course of development is unusual, for eggs are hatched within the body of the mother and pass the larval stage there. When born, they change to pupa, and in a short time develop into adults which live in the wool of sheep and suck their blood. See DIPTERA; INSECTICIDE.

Shef'field, a manufacturing city in West Riding, of Yorkshire, England. Below its picturesque site among several hills the Sheaf and Don rivers join, 165 m. n.w. of London. The prominent public buildings include the parish church, erected during the reign of Henry I, St. Mary's Church, the market hall, the town hall, the Corn Exchange, the University College, St. George's Museum (founded by Ruskin) and several prominent educational institutions and libraries. Since the time of Chaucer, Sheffield has been famous for its manufactures of cutlery; other products are different kinds of brass, steel and iron work. It is an old town, but its history has been comparatively uneventful. Edward I granted it a charter in 1296; during the Civil War it was in the hands of the Parliamenta-

rians. It was made a city in 1893, and now returns five members to Parliament. Population, about 500,000.

Shek'el, a weight and money unit used by the ancients. It was probably about 126 or 130 grains troy weight, and the double measure was 252 or 260 grains troy. The value in silver coin was 56 cents, and in gold $9.10.

Shel'byville, Ind., a city and county seat of Shelby Co., 26 m. s.e. of Indianapolis and 90 m. n. of Louisville, Ky., on the Blue River and on the Cleveland, Cincinnati, Chicago & St. Louis, the Pittsburgh, Cincinnati, Chicago & St. Louis and other railroads. It is situated in an agricultural region, and farming and stock raising are the leading industries. The chief manufacturing establishments include creameries, furniture factories, soda-fountain works, mirror factories, baking-powder, brick, glue and novelty works, cooperages, lumber and planing mills, wagon and carriage works, ice factories and flour mills. There is a public library. Population in 1920, 9701.

Shel'don, Charles Monroe (1857-), an American clergyman and author, born in Wellsville, N. Y., and educated at Brown University and at Andover Theological Seminary. He was ordained in the Congregational ministry in 1886, held pastorates at Waterbury, Vt., and at Topeka, Kan., and in 1912 actively entered the anti-saloon movement in New England. Previously, for one week in 1900, he edited the Topeka *Capital* as a distinctively Christian daily. Dr. Sheldon has written *Richard Bruce, The Twentieth Door, The Crucifixion of Philip Strong, In His Steps, The Miracle at Markham, Born to Serve, Who Killed Joe's Baby?* and *The Good Fight.* He has also edited *One Hundred and One Poems of the Day* and *The High Calling.*

Sheldon, Edward Austin (1823-1897), an American educator. After graduating from Hamilton College, he taught in a school for orphans and poor in Oswego, later superintended schools in Syracuse, N. Y., and after two years returned to Oswego, where he introduced the English teaching methods known as *object lessons* into the United States. After the Oswego City Training School became a state normal school, Sheldon was its president till his death. He was a pioneer of the *new education.*

Shell, projectile for cannon containing explosives. The older shells were made of cast iron; but since armor has become so much more effective, shells have been made of forged steel, have hardened points, and are intended to pierce armor two-thirds of a caliber in thickness; and the armor-piercing shells are designed to pass through any thickness through which they can be driven, and still not be injured in passing. The shell is loaded with some explosive which is intended to be ignited at the critical moment and explode it, thus greatly increasing the damage. The exploding of the shell is accomplished either by means of a fuse, or by its coming in contact with armor. In the armor-piercing shell of more than six inches caliber, the walls are so strong that gunpowder will not burst them, and some more powerful explosive is used, such as picric acid. Shrapnel and canister are more easily burst than shells, and are not used for piercing armor, but are fired directly into the ranks.

Shell, the protective covering of a Mollusk which takes the place of a skeleton. The old idea that the Mollusk builds its shell is true only in the same sense that the higher animals build their skeletons; that is, the shells are the product of a limy secretion of the mantle or skin of the Mollusk, which, to fit the needs of the owner, is found outside of the skin rather than within. The shell is added to by new depositions of the lime, which may be seen in the ridges of a shell.

In olden times conchology, or the study of shells, was a science by itself; it is now recognized that necessary knowledge of the habits, structure and development of the animal which occupied the shell adds to the possibility of classifying it accurately as well as to the interest in the shell.

Shells are of two main classes, univalve and bivalve. The former are of one piece only, while the latter consist of two sections united by a muscular hinge. The univalve shell is generally coiled or spiral; if, when the apex of the shell is up and the opening is toward the observer, the opening lies at the right of the main axis of the shell, it is said to be dextral, that is, its whorls turn from left to right. If the reverse is true, it is said to be sinistral. The lower whorl, which is the largest, is called the body whorl, for in it the body of the animal lies. The other whorls may contain gas, which renders the shell light, or muscular tissue, which holds the shell. Where a shell is made up of various chambers, a tube, called the siphuncle, connects them with the body whorl.

Bivalve shells are more simple and more easily examined. They consist of one chamber shut in by the hinged valves, which may be tightly closed by means of a stout muscle called the adductor, which is fastened to each valve during life and has great contracting powers. The prominent portion near the hinge is called the ear of the shell and is the point of original growth.

Shells differ greatly in detail of form, many having curious projections and variations of size and shape, due to crowded situations during the growing period. From earliest times they have been put to various uses by man. Those of the Murex Family have furnished choice, permanent dyes, which have only recently been superseded by those artificially produced. Mother-of-pearl is the beautiful lining of various bivalve shells. Pearl buttons are made from the shells of the clam, cameos cut from conch and helmet shells, and lime obtained from all varieties. In many countries shells have been used as money and are still so used in some parts of Africa.

Fine collections of shells are a part of most museums of cities and universities. The best known of the United States are those of the Smithsonian Institution in Washington, D. C., the Academy of Science of Philadelphia, the American Museum of Natural History of New York City and the Academy of Sciences of Chicago.

Shel'ley, Percy Bysshe (1792-1822), English lyric poet, born at Field Place in Sussex County. In his early school days the sensitive boy, suffering from the tyranny and persecutions of his mates, developed a hatred of oppression that won for him the name "mad Shelley." In 1810 he entered Oxford, where he displayed unusual literary talent; at the end of six months he was expelled for publishing a tract entitled *The Necessity of Atheism.* The summer following he eloped to Edinburgh with a young girl, Harriet Westbrook, whose stories of an unhappy home life appealed to his strongest passion, the hatred of tyranny. For some time afterwards the young people led an unsettled life in different parts of England and in Ireland, where Shelley went in 1812 in behalf of Irish liberty. The marriage proved unhappy and in 1814 they separated. In 1816 Harriet committed suicide by drowning, and shortly after Shelley was married to Mary Godwin, with whom he had gone to the Continent in July of 1814. She was the daughter of William Godwin, whose revolutionary philosophy had made a deep impression on Shelley. Early in the spring of 1818, broken in health and dejected because of the failure of his suit for the custody of Harriet's children, Shelley left England forever, spending the last four years of his life in Italy. Here his poetic genius flowered wonderfully, but he was cut off in the height of his powers when a sudden storm overtook him during a sailing trip on the Mediterranean. His ashes were placed near the grave of Keats in the Protestant cemetery at Rome.

In the work of Shelley can be distinguished two elements—one philosophical, the other lyrical. His philosophy was revolutionary, involving the belief in the evil of certain social institutions and the independence of the individual. *Queen Mab* (1813), his first important poem, *The Revolt of Islam* (1817-18) and *Prometheus Unbound* (1820) all set

forth his revolutionary ideas. The last named, his most characteristic work and his masterpiece, has wonderful lyric beauty and wealth of imagery. Shelley's genius was essentially lyrical, finding its highest expression in such poems as *Ode to the West Wind, The Sensitive Plant, The Cloud* and *Ode to a Skylark,* which are full of exquisite melody and rhythm. No one has surpassed him in the power of making the movement of the verse harmonize with its mood, beautifully expressed in the *Skylark,* where the bird's flight, ecstasy and singing are suggested in numberless variations by the rhythm. His skill in the use of personification is best exhibited in *Adonais,* the great elegy on the death of Keats. While his poetry is that of an unreal, dream world, Shelley has performed a notable service by adding so richly to the sum of beauty in English verse.

Shen"ando'ah, Pa., a borough of Schuylkill Co., 12 m. n.e. of Pottsville, the county seat, 100 m. n.w. of Philadelphia and 3 m. w. of Mahanoy City, on the Philadelphia & Reading, the Pennsylvania, the Lehigh Valley and other railroads. Shenandoah is situated in a productive anthracite region in the Southern, or Schuylkill, coal field and is an important industrial center. A large number of colleries are within the limits of the borough and a number of others within one mile radius. Among the public buildings and institutions are a free library, several banks, public and parish schools, municipal buildings and good business blocks There are over 20 churches. The Ruthenian, or United Greek Catholic, Church here is said to be the first of this sect in the United States. There are a number of charitable institutions. The chief industries of the borough are connected with the mining and shipping of coal. The industrial establishments include foundries and machine shops, mining-tool works, underwear factories, breweries, printing establishments and woodworking machinery plants.

HISTORY. The first settlement was made about 1850 by William Kelley. With the opening of the first colliery in 1862 the place grew rapidly. Shenandoah was incorporated as a borough in 1866. Population in 1920, 24,726.

Sheol, *She' ole.* See HELL.

Shep'ard, Helen Gould (1868-), an American philanthropist, born in New York. She is the eldest daughter of the late Jay Gould and Helen Day (Miller) Gould. In her early life she became interested in philanthropic work and soon was actively engaged in it by giving large sums of money to educational and charitable institutions and by giving her personal attention and care to many who were in need. At the beginning of the Spanish-American War she gave $100,000 to the United States Government, and at Camp Wyckoff near Montauk Point, Long Island, she aided in the care of convalescent soldiers. Some of her benefactions are the New York University Library and the Hall of Fame, the Sailors' Y. M. C. A. Building in Brooklyn and large gifts to Rutgers College. She is a member of the Women's National War Relief Association and holds honorary degrees from New York University and from the American College for Girls in Turkey. In 1913 Miss Gould married Mr. Finley J. Shepard, of the Missouri Pacific Railroad.

Shep'herd Dog, a variety of dog which takes its name because employed by shepherds in caring for flocks for which it shows remarkable aptitude. The shepherd dog is of large size, has a long, bushy tail and is noted for its intelligence. The Scotch collie is considered the best variety of shepherd dog.

Shepherd's Purse, a common roadside weed of the Mustard Family, named from its flattened, triangular seed pods. The stem is straight and leafy, one-half to one foot in height, with the lower leaves in a close circle about the base of the stem. The flowers are white and insignificant, with four sepals and four petals, and grow in a loose cluster. It flowers from April to September.

Sher'brooke, a city and port of entry of Canada, in the Province of Quebec, capital of Sherbrooke Co., situated at the

confluence of the Magog and the St. Francis rivers, on the Canadian Pacific, Grand Trunk, Quebec Central and Boston & Maine railways. The District Courts are located here, and Sherbrooke is the seat of a Roman Catholic bishopric. Cotton and woolen goods, machinery and lumber and gristmill products are manufactured. The city is named for Sir John Coape Sherbrooke, governor-general of Canada from 1816 to 1818. Population in 1911, 16,405.

SHEPHERD'S PURSE

Sher'idan, Philip Henry (1831-1888), an American soldier, born in Albany, N. Y., and educated at West Point. From 1855 to 1861 he served with credit in Texas and in Oregon, and in May, 1861, he became captain in the 13th Infantry. Having been chief commissary of the Army of the Southwest and on Halleck's staff at Corinth, he became colonel of the Second Michigan Cavalry, so distinguishing himself in this capacity that in September, 1862, he was made a division commander in the Army of the Ohio. At Perryville, Murfreesboro, Chickamauga and at Chattanooga he rendered signal service, and in April, 1864, he was transferred to the Army of the Potomac, as chief of cavalry, and led several spirited raids. The first of these, which he led in Virginia, occurred after the Wilderness, and aimed to sever Lee's communication with Richmond. On Aug. 1, 1864, he was dispatched to the Valley of the Shenandoah, and during this campaign there occurred his famous ride from Winchester to Cedar Creek, a distance of 20 miles, by which he wrung a brilliant victory from seeming defeat. This exploit, the most famous of his career, has been immortalized in art and song. In Grant's final advance upon Richmond, Sheridan was his most able assistant. His action at Five Forks necessitated Lee's flight from Richmond and Petersburg, and, as the Confederates fled, he harassed their rear, finally compelling the surrender at Appomattox Courthouse, Apr. 9, 1865.

Following the war, Sheridan had command in Louisiana and Texas, and for there enforcing the reconstruction acts, was removed by President Johnson, 1867. However, in March, 1869, he became lieutenant-general, and on the retirement of Sherman in February, 1883, was promoted to the command of the army. He was made a general in 1888, and in the same year his autobiography appeared.

Sheridan, Richard Brinsley (1751-1816), an English dramatist and statesman, born in Dublin, Ireland. He studied at Harrow and Essex, married Miss Elizabeth Linley, a professional singer, in 1773, and settled in London. Two years later *The Rivals* was first presented at Covent Garden Theater, and after a careful revision became very successful. A comic opera, *The Duenna,* appeared near the end of the same year. After raising money on mortgages he bought the Drury Lane Theater, and in

1776 it was opened under his management. In 1777 the famous *School for Scandal* was presented, and with the production of this and *The Rivals* he was recognized as having written two of the best English comedies since the Elizabethan Age. The dialogue is sparkling and witty, the situations ludicrous, and in these plays appear the celebrated characters Sir Peter, Lady Teazle, Sir Anthony Absolute, Mrs. Malaprop and Lydia Languish. He served in Parliament for 32 years, retiring in 1812. His speeches were distinguished for their eloquence and unusual power of reasoning; among the most famous were those against Warren Hastings. He strongly opposed the union of England and Ireland, and zealously advocated the freedom of the press. In 1809 the new Drury Lane Theater was destroyed by fire and he suffered heavy losses.

Sheridan, Wyo., the county seat of Sheridan Co., on the Chicago, Burlington & Quincy Railway, 178 m. n.w. of Newcastle. There are coal mines in the vicinity. The manufactures include malt liquors, agricultural implements and other articles. A college is located here. Population in 1920, 9175.

Sher'iff, the chief civil officer of a county. The principal duties of a sheriff are to maintain peace and order, to attend courts as administrative officer, to guard prisoners and juries, to serve processes and execute the judgments of the courts. If a serious disturbance of the peace occurs in the county with which the sheriff is unable to cope he may appeal to the governor of the state, his immediate superior officer, for one or more companies of militia to aid him. Several regularly appointed assistants called deputy sheriffs are clothed with power to act in place of the sheriff. The office of sheriff is elective; the term in nearly all states is two years; and in many of them he may serve only two successive terms.

Sher'man, James Schoolcraft (1855-1912), an American statesman, born in New York. He was educated at Hamilton College and, having chosen the law as his profession, in 1880 was admitted to the bar. In 1884 he was mayor of Utica. Three years later he became a member of Congress, serving until 1909, excepting for the term 1891-93. In 1908 he was elected vice-president of the United States on the ticket with William H. Taft. He was renominated with Taft in 1912, but died before the election in November of that year.

Sherman, John (1823-1900), an American statesman, author of the Sherman Anti-Trust Law, secretary of the treasury under President Hayes and secretary of state under President McKinley. Born at Lancaster, Ohio, a younger brother of Gen. William T. Sherman, he secured only a limited school training, but was admitted to the bar in 1844, and in 1848 entered the field of national politics as a delegate to the National Whig Convention. As congressman from 1855 to 1861 he soon won recognition, and was made chairman of the ways and means committee of the House. In the United States Senate after 1861, except when in the cabinet, he served with distinction as chairman of the finance committee and proved himself not only a master of finance but one of the foremost Americans of his time. He was appointed secretary of the treasury in 1877 and did much towards bringing about the resumption of specie payments. In 1897 he became secretary of state. In 1880, 1884 and 1888 he was repeatedly and very favorably considered for the presidency; and from 1860 to 1900 there was no great financial measure before the nation with which his name was not associated. Consult John Sherman's *Recollections of Forty Years in the House, Senate and Cabinet* and *Sherman Law.*

Sherman, Roger (1721-1793), an American legislator, a signer of the Declaration of Independence, born in Newton, Mass. He was early apprenticed to a shoemaker. In 1754 he was admitted to the bar, having studied alone, and rose to the bench in 1759. Several times he was elected to the Connecticut Legislature, and in 1774 he was a delegate to

the First Continental Congress, serving on the committee appointed to draft the Declaration of Independence. He assisted in preparing the Articles of Confederation and sat in Congress continuously until 1787, when he was delegated to the Constitutional Convention, where he took a conspicuous part. In 1791 he entered the House of Representatives and the same year he became a senator, which position he held at the time of his death. Judge Sherman was one of the most useful men of his day, and Jefferson once declared that he never made a foolish remark in his life.

Sherman, William Tecumseh (1820-1891), an American general, born at Lancaster, Ohio. He was adopted in 1829 by Thomas Ewing, who provided for his education in Lancaster. In July of 1836 Sherman was sent as a cadet to West Point, graduating here four years later, sixth in a glass of 42. For one year after graduation he served as second lieutenant in the Third Artillery sent against the Seminoles in Florida, and in 1841, as first lieutenant, commanded a small force at Picolata. During the Mexican War he served in California as adjutant-general, becoming captain in 1848. Shortly after his marriage to Miss Ellen Ewing, daughter of his foster father, Sherman was appointed captain in the commissary department and was sent to St. Louis and New Orleans. In 1853 he resigned his commission and entered a banking business in San Francisco; in 1858-59 he was practicing law in Leavenworth, Kan., and in 1860 became superintendent of the Louisiana State Military Academy, a position which he held until the state seceded in 1861, when he went North and joined the army.

Sherman was active in the Civil War from the beginning, receiving the rank of brigadier-general of volunteers for gallantry in the first Battle of Bull Run and saving the day at the Battle of Shiloh by his brilliant generalship (See SHILOH, BATTLE OF). His next important service was in connection with the siege and capture of Vicksburg (See VICKSBURG CAMPAIGN), where his activity won him an appointment as brigadier-general in the regular army. On Nov. 23-25, 1863, Sherman took part in the Battle of Missionary Ridge, where Bragg was defeated and driven back into Georgia. After rendering important service around Chattanooga he was sent to relieve Burnside at Knoxville, and in March, 1864, he succeeded Grant as commander of the military Division of the Mississippi. On the following fifth of May he began that great campaign against the Confederate army in command of Johnston which ended in the capture of Atlanta the following September. Then followed Sherman's memorable march "from Atlanta to the sea," with an army of 65,000 men, and the capture of Savannah in December, 1864.

On Feb. 1, 1865, Sherman began his northward march ending with the surrender of Johnston's army on Apr. 26, 1865, at Durham Station, N. C. This surrender brought the war to a close. On May 24, after completing a march of nearly 2000 miles through an unfriendly country, he passed in review with his victorious army before President Johnson, General Grant and an enthusiastic host in the city of Washington.

After the war General Sherman was appointed to the command of the second military station. When Grant was made general of the army, in 1866, Sherman was made lieutenant-general, and in 1869 when Grant became president, Sherman was appointed general to succeed him. In 1871-2 he made a professional tour in Europe, being everywhere received with high honors. At his own request he was placed on the retired list in 1884. Sherman was a thorough organizer and an able executive. *Memoirs of Gen. W. T. Sherman, by Himself* was published in 1875.

Sherman, Tex., a city and the county seat of Grayson Co., 64 m. n.e. of Dallas and 9 m. s. of Denison, on the St. Louis & San Francisco, the St. Louis & South Western, the Missouri, Kansas & Texas, the Texas & Pacific, the Houston & Texas Central, the Gulf, Colorado &

Santa Fe and other railroads. Electric lines connect the city with Denison and Dallas. The city is situated on a ridge 720 ft. above sea level between the valleys of the Red and Trinity rivers. The section is engaged chiefly in stock raising and the growing of Indian corn, wheat, cotton, oats, alfalfa and potatoes. It has various manufactures, the principal plants being foundries, machine shops, flour mills, brickyards, planing mills, cotton gins, compresses and cottonseed-oil mills and a carriage factory. Sherman is the seat of Austin College (Presbyterian), Carr-Burdette College (Christian), North Texas Female College and Conservatory (Methodist Episcopal) and St. Joseph's Academy (Roman Catholic). The place was settled in 1848 and is administered under a charter of 1895. Population in 1920, 15,031.

Sherman Anti-Trust Law, a law enacted by Congress in 1890 providing for the restraint of trusts. It takes this name because introduced by Senator John Sherman. "This statute provides that all contracts, combinations in form of trusts or otherwise, or conspiracies in restraint of interstate or international commerce are illegal, and that all persons participating in such agreement, combination or conspiracy are guilty of a misdemeanor and subject to a penalty for violation of the act."

The Supreme Court has held that this statute applies to railroads as well as to other corporations; and under it the Northern Securities Company, capitalized at $400,000,000 for the control of the Great Northern and Northern Pacific railroads, was dissolved in 1904. The successful prosecution of this case is considered by some writers "the most positive achievement of the Roosevelt administration in the field of corporation finance." Under this law also the Standard Oil Company of New Jersey was dissolved in 1911, while the Tobacco Trust, the United States Steel Corporation, the International Harvester Company and other great corporations, including the alleged Beef Trust, have been compelled to recognize its requirements.

The creation in 1903 of the department of commerce and labor (now the department of commerce), and the collection of a corporation tax, under the Payne-Aldrich Tariff Law of 1909, have compelled the submission of financial statements, which the department of justice has found of great value in its attempts at a general and thorough-going enforcement of the Sherman Law.

The ultimate dissolution of the trusts prosecuted has not, however, been followed by such prosecutions under the criminal clause of the act as had been expected by the public. Nor has monopolistic control of great industries by the few been prevented, or their accumulation of enormous wealth been retarded, as is evidenced by a stock dividend of $29,000,000 (Mar. 20, 1912) by the Standard Oil Company of Indiana. This corporation was one of the subsidiaries of the Standard Oil Company of New Jersey (dissolved in 1911). It has a capital of only $1,000,000. See CORPORATION; UNITED STATES STEEL CORPORATION; CORPORATIONS, BUREAU OF; TRUSTS; STANDARD OIL COMPANY.

Sher'wood, William Albert (1859-), a Canadian artist, born in Ontario. He began portrait painting when 15, and his most successful portraits include those of Sir G. W. Ross, Rev. Dr. Scadding, S. P. May, Alexander McLachlan and W. D. Lighthall. Of his Canadian pictures of common life, *The Gold Prospector* is owned by the Ontario Government and *The Negotiation* belongs to the Dominion Government. His works have been displayed at all the important art exhibits of the United States, Canada and England.

Shet'land, or **Zetland, Islands,** a group of islands, a possession of Scotland, lying between the Atlantic Ocean and the North Sea. They are 210 m. w. of Norway and 50 m. n.e. of the Orkney Islands. Their area is about 550 sq. m. Of the 100 or more islands, only 23 are inhabited. Mainland, the largest island, contains the principal town, Lerwick. The chief industry is fishing for cod, herring and ling. Cattle and sheep are

also reared, and these islands are the original home of the Shetland pony, now famous throughout the United States. Population in 1911, 27,911.

Shield, *Sheeld,* a piece of defensive armor used in ancient and medieval warfare. The large shield of the Greeks was circular or oval, often highly ornamented. The Romans had a large shield, quadrangular and bent partly to surround the body, and a smaller one for lighter-armed men. Among Germanic peoples the shield was the chief insignia of honor. To be lifted on it was to be raised to the position of leader. Shields later bore the device by which its owner might be known. After the spread of Christianity they often bore the symbol of the cross.

Shil'laber, Benjamin Penhallow (1814-1890), an American humorist, born at Portsmouth, N. H. In 1830 he became a printer at Dover, N. H., and removed to Demerara, Guiana, in 1835, where he was a compositor in a printing office. In 1840 he became connected with the Boston *Post,* editorially after 1847, and began to contribute sketches under the pen name of Mrs. Partington. He edited the *Pathfinder* from 1850 to 1852, served on the *Carpet-Bag,* and returned to the *Post* in 1853-56. In 1856 he became one of the editors of the Boston *Saturday Evening Gazette.* His works included *Rhymes With Reason and Without, Poems, Life and Sayings of Mrs. Partington, Knitting-Work, Partingtonian Patchwork* and *Ike and His Friend.*

Shilling, an English silver coin equal in value to 12 pence or 1/20 of a pound sterling. It is about equal to 24 cents in United States money. It was in common use in the American colonies before the Revolutionary War. In some localities the term *shilling* is still used in reckoning money, but its value is 12½ cents, and it is not the English shilling.

Shi'loh, Battle of, the most hotly contested engagement of the Western armies during the Civil War, fought Apr. 6 and 7, 1862, from Shiloh Church to Pittsburg Landing, on the Tennessee River, Tenn. Grant's Army of the Tennessee, 40,000 strong, had moved southward to Pittsburg Landing, and Johnston and Beauregard, who had an equal army of Confederates at Corinth, about 20 m. distant, planned to attack Grant before he should be joined by Buell's Army of the Ohio. On Apr. 6 the Confederates surprised the Union troops completely, no intrenchments having been thrown up and Grant having spent that very night at Savannah. Sherman displayed great ability as commander of the Union right, but by nightfall the Federals had been pressed back over a mile. The second day, having been reinforced by Lew Wallace and Buell, with 25,000 fresh troops, the Federals recaptured their original position and the Confederates retreated, but in good order. The Federals lost 13,000 men, including Gen. W. H. L. Wallace, killed, and Gen B. M. Prentiss, captured; the Confederates lost 10,700 men, including Gen. A. S. Johnston, whose death was a great catastrophe to the South.

Shin'ny. See HOCKEY.

Shin'toism, the original religion of Japan, probably antedating the Christian Era by 20 centuries. It developed from a form of nature worship into worship of ancestors and heroes, but without wholly losing traces of its earlier character. The mikado is considered to be the direct descendant of the sun goddess Amaterasu and is an object of worship. Buddhism was introduced in 552 and has greatly modified the older religion; and Christianity in later years has modified it still further.

Ship, in general, a vessel larger than a boat, specifically a large vessel designed for long voyages. In modern times the term, when used without modification, means a large sailing vessel. A ship has at least two masts; it usually has more. The body of the ship, called the hull, is usually three or four times as long as broad at the widest point. In nautical terms the width of the ship is called the beam; therefore, the proportion of length to beam is about four to one. A square-rigged vessel is one carrying square-cut sails, so set that their

surface is at right angles to a line drawn from the bow to the stern. A schooner is a ship carrying two or more masts with fore and aft sails, which are so set that their surface is diagonal to a line drawn from the bow to the stern. A brig is a ship which has its last two masts square-rigged. A schooner can sail much closer to the wind than a square-rigged vessel; it can also be more easily turned. For these reasons the schooner forms the most desirable type of sailing ship, and is more frequently seen than other large sailing ships. In America schooners are still used in coastwise traffic on the ocean, and to a limited extent on the Great Lakes. They vary in size from less than 100 ft. in length to 395 ft.

Before the advent of the steamship, sailing vessels were engaged in both passenger and freight traffic throughout the world. The best of these ships were the product of American shipyards, and they were noted for their strength, speed and safety. A ship of this sort, built for both passenger and freight traffic, was called a packet ship. The best of these ships would cross the Atlantic from New York to Liverpool in about 13 days, and between 1830 and 1860 there were a number of lines of packet ships making regular voyages between American and European ports. With the development of the steamship, however, sailing vessels fell into disuse, and after the Civil War they were practically abandoned for trans-Atlantic trade. See STEAMSHIP.

HISTORY. The sailing vessel is of ancient origin, and there is no authentic record of the time it was first introduced. The Phœnicians were a maritime nation, and doubtless the Hebrews, as well as the ancient Greeks and Romans, learned something of navigation and shipbuilding from them. The early warships of the Greeks and Romans were propelled by oars, the largest having two or three banks, one above the other, and employing a large number of men.

After the fall of the Roman Empire, navigation was neglected for several centuries, but with the invention of the mariner's compass and the demand for a water route to India, interest in it was revived, and in the 15th century the circumnavigation of Africa and the discovery of America gave an impetus to navigation that has continued to the present time. The long voyages made necessary by these discoveries required larger and better ships, and in response to this demand improvements were made from time to time until the best pattern of American packet ships was reached.

Ship'worm". See TEREDO.

Shit'tim. See ACACIA.

Shod'dy, a fiber made by cutting up, shredding and carding woolen, worsted or mixed rags, and used in the manufacture of woolens. The rags are thoroughly washed, then shredded and carded into long, fluffy rolls, which are packed into bales by hydraulic pressure and sold, to be used in the manufacture of cheap woolen goods. The term *shoddy* is given to articles that are not the things described, but pretend to be better than they are. See WOOL, MANUFACTURE OF.

Shoebill, *Shoo' bill,* a heronlike bird with a large, broad, flattened bill, over eight inches in length, and hooked at the end. The bird stands about four feet in height and has long legs and a short neck. The plumage is grayish, darker above than below, a part of the back and wings having a greenish tinge. The feathers of the breast and a part of the neck have a dark stripe in the center. The nest is a bare hole in the earth, near some body of water. As many as a dozen eggs are laid. The shoebill lives on the upper White Nile in Egypt and associates in flocks numbering as high as 100 birds. They are usually seen in or near the water. Their food consists of fish and water snakes.

Short'hand", the method of writing by which a skillful person may record the words of the most rapid speaker. Shorthand is sometimes designated as stenography (compressed writing), and in the modern Pitmanic system as phonography (sound writing). Some forms of abbreviated writings were used long before the time of Christ. Tiro, the

amanuensis for Cicero, the great Roman orator, is known to have been skillful in the use of such a system.

The first modern work on shorthand was published in England in 1588 by Dr. Timothy Bright. This was followed by others which attracted more and more attention. In 1672 Thomas Gurney issued his system of *Brachygraphy,* perpetuated by his descendants who, since about 1800, have officially reported the proceedings of the houses of Parliament. Samuel Taylor's *Stenography,* published in 1786, simplified the symbols used and made possible more rapid writing. From it several other systems were developed.

In France, Jacques Cossard had prepared a shorthand system before 1651; while in Germany the earliest work on this subject appeared in 1679. Today, the name of Duployé in France, and those of Gabelsberger and Stolze in Germany, are famous for important services in the development of shorthand systems used not only in these but in numerous other countries of Europe.

The system of *phonography* devised by Isaac Pitman, and first published in England in 1837 under the title *Stenographic Sound-Hand,* is widely used throughout the English-speaking world and has been adapted to many other languages. This system was introduced into America in 1844, aroused great interest throughout Canada and the United States and is today used by thousands of writers. In 1853, Benn Pitman, a younger brother of Isaac Pitman, located in the United States; and he also has rendered important services in extending and improving the methods of shorthand instruction. The Graham and Munson systems are classed as Pitmanic; and there are today numerous others not so generally used. There are also a number of Non-Pitmanic systems, such as the Gregg, McKee, Cross and Pernin.

One who has mastered any Pitmanic system can soon acquire either of the others of that class. The Non-Pitmanic systems differ perhaps as greatly from one another as from the Pitman phonography. The Gregg system, which has gained many adherents in the Western States, has several striking features. There is no shading and no position writing, while the slant is the same as in long hand, and curves rather than angles are common. The McKee system retains the Pitmanic shading, but does not use positions. Its vowels are composed of circles and ellipses in different sizes.

There are now thousands of shorthand writers who can record and correctly transcribe the speeches of any ordinary speaker. Records taken with the greatest care show that a considerable number of writers can set down from 250 to 275 words per minute, for 10 or 15 minutes in succession; while much higher records have been made for shorter periods.

Shoshone Falls, a beautiful cataract in the Snake River, Idaho, on the southern boundary of Lincoln County. The river, after flowing through a canyon 800 ft. deep, broadens to a width of 950 ft., plunges 30 ft. through rocky channels and, again widening to a broad sheet, makes a vertical descent of nearly 200 ft. into a dark green lake at the bottom of the gorge. For several miles above the falls there are numerous rapids and cataracts. The cataract is surpassed in the United States only by Niagara Falls.

Shoshoni, *Sho sho' ne,* a tribe of North American Indians formerly occupying the mountainous country in Wyoming, adjacent portions of Colorado and Utah, Idaho and the northeastern part of Nevada. The Shoshoni, Banak and Piute have been collectively known as the Snake Indians, though they were divided into numerous bands which had little connection with each other. At present they number about 2500, all of whom are on reservations in Idaho, Wyoming and Nevada.

Shot, the name given to all solid projectiles from firearms. The distinction between shot and shell is that shot are usually solid and never contain explosives, while shells are hollow and filled with explosives. A single, solid

shot of heavy ordnance pieces often weighs a ton or more. Since the introduction of rifled guns the shot is usually elongated and pointed instead of round. The name shot is also applied to small pellets of lead used in sporting guns. These shot are made by dropping melted lead from a considerable height through a colander into water.

Shot'gun", the name of a weapon used for shooting small game, such as quail, grouse, water fowl, squirrels and rabbits, with shot instead of a ball or bullet. Formerly shotguns were single-barreled and were loaded with a ramrod by entering the ammunition at the muzzle. These were at first provided with a flint lock and powder pan to ignite the charge. The breech-loading gun was invented in 1836; it consists, as now made, of one or two barrels opening at the breech by means of a hinged joint to allow the entrance of the cartridge which contains the charge. The cartridge is made of a shell of thin brass or pasteboard having at one end a rim by which it can be extracted from the barrel. In the center of this rim fits a percussion cap, which is ignited by a blow from the hammer of the lock. These are known as breech-loading shotguns. The hammers are sometimes concealed in the lock, and the gun then is called a hammerless gun. Guns that carry the cartridges in the breech or in a tube called a magazine and that are operated by a sliding mechanism under the barrel are made single-barreled, and are familiarly termed pump guns. Another pattern, which has recently been introduced, is the automatic shotgun. The discharge of one cartridge by its recoil operates a feeding or loading mechanism, so that all the shells the magazine can hold may be fired in a few seconds by simply pressing the trigger.

The best gun barrels are made of Damascus laminated steel and in bores of from 20 to 10, the former used principally by collectors of birds, and the latter by professional hunters of ducks and geese.

Shoveler, *Shuv' el er,* or **Spoonbill Duck,** a bird of the Duck and Goose Family. This duck may be recognized by its peculiar shovel-shaped bill, which is armed with fine comblike teeth along the sides. In the male the head and neck are black; the sides and back have a greenish gloss; the chest is white; the under parts, chestnut; the wing coverts, blue, with a white bar and a green patch; the shoulders are streaked with black, white and blue; the bill is black; and the feet are orange. The female is streaked with light brown; the wings are as in the male, but not so bright. The nest is placed on the ground either in grass or under a bush, and is made of grass, lined with feathers. It contains 9 to 14 buff-colored eggs. The shoveler duck is fairly common throughout North America from Alaska to Texas. The birds are usually seen in pairs or in small flocks, feeding in shallow ponds or near the shore in rivers.

Shreve'port, La., second city in size in the state and county seat of Caddo Parish, 325 m. n.e. of New Orleans, about 15 m. from the Texas boundary, on the Red River and on the Houston & Shreveport, the Vicksburg, Shreveport & Pacific, the Kansas City Southern, the St. Louis & South Western, the Louisiana Railway & Navigation Company, the Missouri, Kansas & Texas, the Louisiana & Arkansas, the Texas & Pacific and other railroads. Owing to its excellent transportation facilities the city has a large and important trade. The surrounding region is chiefly devoted to cotton growing and live-stock raising, and the city is the principal shipping point for cotton and agricultural products. The Caddo gas and oil fields, north of the city, were first developed in 1906 and have added greatly to the industrial interests.

The noteworthy buildings of Shreveport include a Federal Building, courthouse, Louisiana State Hospital, Genevieve Orphanage, Schumpert Memorial Hospital, five banks and about 12 churches. Among the industrial establishments are cotton compresses (one of them the largest in the world), cotton gins, fertilizer works, cottonseed-oil

mills, railroad shops, foundries and machine shops, ice factories, lumber mills, window glass and bottle works, woodworking plants and oil refineries. Shreveport was first settled in 1835 and named in honor of Henry Miller Shreve, who, in 1815, ascended the Mississippi and Ohio rivers to Louisville in the *Enterprise*. This boat was the first steam vessel to make this trip. A city charter was granted in 1871. Population in 1920, U. S. census, 43,874.

Shrew, a family of widely differing little animals, belonging to a class known as the Insectivora, or Insect Eaters. Shrews are found in all parts of the world except Australia and vary in size from the long-tailed shrew, which is the smallest Mammal known, being about the size of the end of the little finger, to the larger, ratlike shrews of Egypt. All have keen eyes, small external ears, furry bodies and a flexible, prolonged snout. The tails are generally long and are apt to be hairless. Underneath the forelegs are glands secreting a liquid of musky odor, which no doubt protects the shrew from the depredations of larger animals. Shrews are active animals, living on the surface of the ground or in trees, and never under the ground as do their relatives, the moles. Their food is insects, grubs and worms, varied occasionally by a diet of beechnuts and fleshy roots. To assist in procuring this fare, their incisors are long and outward curving. They are hardy and may be found running about in the coldest weather, although their timidity renders them cautious and they are said to be easily frightened to death. The water shrews are an aquatic species.

Shrew Mole, a family of Mammals, intermediate between the shrews and the moles, in form and habit resembling the latter but in many points of anatomy nearer to the shrews. They dig their galleries and tunnels close to the surface in such a manner as to leave soft mounds of sod, which indicate the passages underneath. Its form exactly suits it to this underground work, for its nose is pointed, its eyes small and fur-protected, its fur thick and glossy and its paws strong and well adapted for digging. The eyes, however, are capable of adaptation to light, so that when the shrew moles come to the surface of the ground they are as well able to see as their above-ground neighbors. Shrew moles are found throughout the United States, especially in the Northern and Middle states. See MOLE; SHREW.

Shrike. See BUTCHER BIRD.

Shrimp, a family of salt-water Crustaceans, highly prized as a food. When alive, they are semitransparent animals, resembling the crayfish in form and living in shallow waters that have sandy bottoms. They have two long antennæ or sensitive processes, and short, fan-shaped tails. Like the lobsters, their first pair of feet have pincers which are of use in catching and crushing their prey. Shrimps are taken in large quantities upon the New England coast and are boiled, a process which turns them red; they are then canned and shipped to all parts of the United States. They are also an important article of food on the Pacific coast.

Shrove Tuesday, the day preceding the first day of Lent, or Ash Wednesday. The name *Shrovetide* is applied to the last few days preceding Lent. Formerly Shrove Tuesday was a festal day celebrated with games and festivities. In New Orleans the day is celebrated by a street pageant known as the *Mardi Gras*.

Shuf'fleboard, originally an English indoor game, and sufficiently popular to be forbidden by law during the reign of Henry VIII, because for it the people neglected the practice of archery (See GOLF). For the shuffleboard now popular on ocean steamers, a portion of the deck is marked out into squares. The opponents take their wooden disks, or pieces, to positions agreed upon, several paces from the board. Then, with crutch-shaped cues, each in turn attempts to shove one of his two pieces into desirable positions on the *board,* while aiding a partner, or harassing his opponents by driving their men from positions already secured. The game was first called *shove-*

board, and later *shovel-board.* In scoring, each counts those numbers marked on the squares in which his pieces rest. The outdoor game is for 21 points; the steamer game for exactly 50. In the old indoor game, the pieces are iron disks, about two and one-half inches in diameter, weighing one pound each. The board is 30 ft. long, with raised edges, and is sprinkled with sand. In this game the players score three for a piece left projecting over the end of the board, or two for a piece resting within, or on, a line drawn five inches from the end. If no piece is inside the line, one is scored for the piece nearest to the line. In either game two instead of four may play.

Shus'ter, William Morgan (1877-), an American lawyer, born in Washington. He studied at the Columbian Law School, and in 1898 became a stenographer in the United States War Department. Later he engaged in the Cuban and Philippine customs service, becoming a member of the Philippine Commission and secretary of public instruction for the Philippine Islands. In 1909 he returned to the United States, completed his law course and began practicing in Washington, D. C., when he was suggested by the state department as a man competent to bring order out of the confused condition of finances in Persia, in response to a request from that country. In May, 1911, he arrived in Persia and assumed the duties of treasurer-general, holding his position until the following December and performing his task with conspicuous efficiency and honesty. Although successful in putting Persian finances on a stable basis, he incurred the displeasure of the Russian Government in the matter of his appointments, and the Persian Government, much against its will, was forced to dismiss him. See PERSIA, subhead *History.*

Siam, *Si am'*, an Asiatic country lying between British Burma and French Indo-China. It has now an area of 200,000 sq. m., having lost much territory to the French upon one side and to the English upon the other. Physically Siam forms chiefly the broad basin of the Menam River, whose alluvial plain is a remarkably fertile tract where rice is raised in abundance. The northern part of the country is mountainous and contains a wealth of gold, iron, copper, antimony, zinc, tin, rubies and sapphires. Forests and jungles abound in the south and here teak and other valuable woods are produced. The so-called white elephant, a light-colored variety, is held sacred in Siam; other jungle beasts, as the crocodile, rhinoceros, tiger, leopard, boar and gibbon, abound. The year has but two seasons, a long moist summer followed by a dry season.

The people of Siam are of many races, chiefly Siamese, Chinese and Laotians. They are busily engaged in agriculture and in the export trade, the latter being carried on mainly with Great Britain, through Singapore. In religion they are Buddhists, and the Church rules all educational and many political affairs. English and mission schools are, however, maintained at Bangkok. For purposes of government Siam is divided into 40 provinces. The ruler is a king, who, though absolute in power, is aided by a cabinet and a Legislative Assembly. Since the 17th century, when Siam began to enter into diplomatic relations with foreign countries, its government has been generally improved. The population of Siam is 7,562,000.

Siam, Gulf of, a gulf of southern Asia separating the narrow neck of the Malay Peninsula from French Indo-China. It is really a part of the South China Sea and receives many important rivers, chiefly the Menam. Bangkok, at the head of the gulf, is its principal seaport.

Sibe'ria, the great Asiatic possession of the Russian Empire stretching from the Chinese Empire on the s. to the Arctic Ocean on the n., and from the Ural Mountains at the w. to the Bering Sea and the Sea of Okhotsk, arms of the Pacific Ocean, upon the e. It covers an area of 4,800,000 sq. m., or about two and one-half times that of European Russia.

SIBERIA

Physical Characteristics. Siberia is generally a broad, monotonous plain sloping slightly to the north. So few are its irregularities at the west that the watershed between the Obi and the Yenisei is scarcely noticeable. In the east the Stanovoi Mountains extend almost to the northeastern angle of the continent and follow the coast line along the Sea of Okhotsk until they merge with the Yablonoi Mountains, separating Siberia from Manchuria. Still farther west and following the southern boundary are the Altai Mountains. Here are the highest peaks of the range, many being nearly 15,000 ft. in height.

The great rivers of Siberia flow north to the Arctic Ocean. They are chiefly long, slowly-flowing streams, which serve for navigation during the summer but through the long winters are completely icebound; the Obi, the Yenisei and the Lena are the chief of these.

Climate and Productions. The climate of Siberia presents great variations of temperature. At the north the winters are extremely severe, the temperature sometimes reaching from 60° to 70° below freezing. The summers are short but warm, and the long days of midsummer give opportunity for the growth of vegetables and other crops. In the northeast the soil is frozen continually, except for a few inches at the surface during the warmest months. Underneath this is a layer of perpetual ice. In eastern Siberia there is little rain or snow and sledges can seldom be used. The great level tundra at the north bears little vegetation except in summer, when many quickly-maturing flowering plants spring up, bloom and disappear. South of the tundra and stretching across the entire length of the country is a belt of stunted trees; and at the south a woodland and forest belt, rivaling the Amazon in the extent of its forests, stretches to the Mongolian and Manchurian boundary. These vast groves are of pine, maple, oak, beech, poplar and white birch. Through this tract grains and the crops of the temperate regions may be raised. The fertility of the soil and the advantages offered by the Russian Government are leading many of the better class of Russian peasants to settle in this region, especially near the Trans-Siberian Railway, and already fully 50 of these farming villages have sprung up. Crossing from China to Russia one quickly notices the marked change from the lack of dairy products to the abundance of butter, cream, milk, Dutch cheese and eggs. This is because the great expanse of Siberia with its comparatively few inhabitants offers especial advantages for stock raising, and the best breeds of cattle are being introduced.

As yet the mineral resources are not fully known. Silver, gold and platinum are mined in the Ural Mountains, while salt, sulphur, lead, coal and copper exist in abundance in other regions.

People, Cities, Etc. Tomsk, on the Obi River, is the chief and almost the only manufacturing city. Its products include porcelain ware, carpets, flour, sugar and ironware. Irkutsk, at the head of Lake Baikal, is destined to be a great trade center when the road is built to it from Peking. Already its position near the great inland sea, said to be the only one where seals are found, has given it importance. Vladivostok, the extremity of the Trans-Siberian Railway, is a growing port with increasing trade with the United States. The people of Siberia are chiefly Russians, although Germans, Aryan Gypsies, Finns, Tartars, Chinese, Manchus and Koreans are not uncommon. The country was long used as a place for banished criminals and political exiles, but deportation has almost ceased. Many large prisons still are maintained, one of the largest being located not far from Irkutsk.

History. Western Siberia was taken for Russia by the Cossacks in 1582, and from that time Russian influence pushed steadily eastward. By 1861 it had reached the Pacific. Port Arthur and other Chinese and Manchurian regions were leased to the Russians for military purposes, but their failure to evacuate these posts at the end of the lease led to the

Russo-Japanese War in 1904. Since that war the Russian policy has been the development rather than the extension of Siberia. Population, 8,220,100.

Sibyl, *Sib' il,* in Greek legend the name of certain women upon whom Apollo was supposed to have conferred the power of prophecy. At first it would seem that there was but one, but their number was increased until there were ten. They were the legendary authors of the Sibylline Books. According to legend, one of these women, the Cumæan Sibyl, appeared before King Tarquin the Proud with nine books, which she offered to sell him at a very high price. When Tarquin refused to buy on account of the price, she retired, destroyed three volumes, then returned and offered the six at the original price, but was refused. Again the Sibyl retired and destroyed three more volumes. She then returned to Tarquin, who purchased the three for the price originally asked for the nine. The books were placed in the Temple of Jupiter on the Capitol, where they remained until the destruction of the temple by fire in 83 B. C. A special commission was sent to Greece to make a new collection, which consisted of about 1000 verses. This collection was revised by Augustus. It was kept in a room of the Temple of Apollo, where it was carefully guarded. It was destroyed about 400 A. D.

Sicilies, *Sis' i lis,* **Kingdom of the Two,** a former kingdom of Sicily consisting of Naples and Sicily. These districts were objects of contention between the Greek emperors, the Lombards and the Saracens when the Normans from France joined in the struggle in the 11th century. Robert Guiscard began the Norman conquest on the Continent. Roger II, his nephew, finished the struggle there, and, after adding Sicily to his conquests, he called his possessions The Kingdom of the Two Sicilies. Naples and Sicily were thus united for 150 years.

The conquest, started by Charles of Anjou in 1268, led to the separation of the two parts from 1282 to 1504, when they were reunited under the Spanish crown. After the Peace of Utrecht (1713), they were again divided, but in 1720 the two were again joined, this time under Austrian rule. In 1734 Don Carlos, son of Philip V of Spain, conquered both parts, and this line of Bourbons continued to rule until 1860, except during the Napoleonic period when Joseph Bonaparte and Joachim Murat ruled as kings of Naples.

The successors of the Napoleonic kings were tyrants. An insurrection broke out in Sicily in 1860, and Garibaldi, after driving the Neapolitan troops from the island, crossed to Naples and easily won it. Francis II, the ruler, fled, and by a popular vote the two Sicilies became a part of the Kingdom of Italy.

Sicily, *Sis' i ly,* the largest island of the Mediterranean, lying southwest of Italy, of which it is a possession. The Strait of Messina separates it from the Continent. Its area is about 9936 sq. m. The surface is mountainous, the long chain extending the length of the island apparently being a continuation of the Apennines. The loftiest peak is Mt. Etna, 10,750 ft.; its crater is active, revealing the volcanic nature of the interior of the island. The climate is generally agreeable, except for the occasional *sirocco,* a dry desert wind, and the fact that almost no rain falls during the summer. The chief industry is agriculture, and oranges, lemons, olives, grapes, almonds, sumac and beans are cultivated. Rock salt and asphalt are found, and Sicily leads the world in supplying sulphur. Glassware, metalware and matches are manufactured. The fisheries furnish employment to at least 20,000 people. Palermo has an excellent harbor; Messina and Catania are also important ports. The Sicani and the Siculi inhabited the island in the early ages; later, Greek and Phœnician colonies were established. In 212 B. C. Sicily became a Roman province. Garibaldi invaded the island in 1860 and the following year it was made a part of the United Kingdom of Italy. See ITALY, subhead *History*; SICILIES, KINGDOM OF THE TWO.

Sick'le, an implement consisting of a steel blade curved into the form of a hook, with a straight handle. In operating the sickle the workman grasps the bunch of grass in his left hand and brings to bear against it the inner edge of the blade. The sickle was superseded by the cradle in cutting grain; and the cradle, in turn, has been replaced by reaping machines. See REAPING MACHINE.

Sickles, *Sik' 'lz,* **Daniel Edgar** (1825-1914), an American soldier and politician, born in New York City. Educated at New York University, he studied law and in 1846 was admitted to the bar. Later he was a Tammany Democrat in the State Legislature and corporation counsel of New York City, and, having served for two years as secretary of legation at London, in 1857 entered Congress. At the outbreak of the Civil War, he raised a New York brigade and became colonel of one of its regiments. In November, 1862, he was appointed major-general of volunteers. He commanded a brigade in McClellan's Peninsula Campaign and at Antietam, was division commander at Fredericksburg, and corps commander at Chancellorsville and Gettysburg, where he lost a leg. Following the war he commanded the Department of the Carolinas, engaged in secret diplomatic service in South America and, having retired from the regular army in 1869, with the full rank of major-general, from then until 1873 was minister to Spain. In 1888 Sickles was president of the New York State Board of Civil Service Commissioners, and from 1892 to 1894 he again sat in Congress.

Sick Man of Europe, the nickname for Turkey. It is claimed that this celebrated remark was made by Czar Nicholas of Russia in conversation with the English minister at St. Petersburg on circumstances which later led to the Crimean War in 1853-1856. "We have on our hands," said the Czar, "a sick man —a very sick man; it would be a very great misfortune if he should give us the slip some of these days, especially if it happened before all the necessary arrangements were made." The Czar had cultivated friendly relations with the English Government and he proposed that England and Russia should divide the estate of the "sick man," meaning Turkey. England was to be allowed to take Egypt while the Turkish provinces were to be taken under the protection of the Czar, which meant the absorption in due time of all southeastern Europe into the Russian Empire.

Sidereal, *Si de' re al,* **Time,** time measured by the movement of the heavenly bodies. A sidereal day is the time of the earth's revolution in its axis from the instant that the first point of Aries crosses the meridian until it arrives at the meridian again. This is 24 hours sidereal time, or 23 h., 56 min., 4.09 s. solar time. The difference arises from the fact that as the earth rotates on its axis it also passes through about one degree per day in its revolution about the sun, so that it must rotate through a part of this degree also, after completing a revolution before the first point of Aries comes again across the meridian. See MERIDIAN; CELESTIAL SPHERE; EARTH.

Siderite, *Sid' er ite,* or **Spath'ic Iron,** a valuable ore of iron, sometimes called chalybite. It occurs in association with clay slate, gneiss and mica schist, is sometimes massive, sometimes granular or crystallized. The color varies from ash-gray, yellowish or greenish-gray to brown, brownish-red or white. It is found in Vermont, Massachusetts, Connecticut, New York and North Carolina.

Sid'ney, Sir Philip (1554-1586), a British soldier and writer, born at Penshurst in Kent and educated at Shrewsbury and Christ Church College, Oxford. After leaving college he traveled extensively on the Continent, making a special study of literature and politics and making the acquaintance of eminent men. He became attached to the court of Elizabeth, with whom he was a great favorite. In 1577 she sent him on a special mission to Heidelberg and The Hague. In 1585 he was appointed governor of Flushing and took part in the war between the Queen's allies, the Dutch and

the Spanish. He was mortally wounded in the Battle of Zutphen and died after great suffering. His refinement, his gentle spirit and his ability as a writer and courtier caused Sidney to be held in the highest esteem, and there was universal mourning at his death. He is still considered as the highest type of a courtly gentleman. His chief literary work is the *Arcadia,* a prose tale interrupted at intervals by passages of verse. Other works are *Astrophel and Stella* and *Defense of Poesie.*

Sid'ra, Gulf of, an arm of the Mediterranean, extending along the coast of Tripoli. Its length inward is from 75 to 125 m., and at its mouth it is 300 m. in width. There are practically no good harbors, and the shallow waters along its shores render navigation dangerous.

Siege, *Seej,* the attempt to capture a city or fort by cutting off all communication with the outside. The besieging army builds its works parallel with those of the besieged, so that their fire will not be lengthwise of the lines. These parallels are moved nearer and nearer to the city, and tunnels are sometimes made and mines sprung under the works of the besieged. While these works are being pushed provisions are giving out in the besieged city or fort; the water supply is cut off, if possible; and no supplies are allowed to be carried in either by land or sea. A siege is frequently accompanied by bombardment from neighboring hills. Sieges result in loss of life, sickness and often in pestilence. When the besieged are sufficiently reduced the siege usually terminates in an assault.

Among notable sieges may be mentioned the 14 months' siege of La Rochelle in 1628; the four years' siege of Gibraltar by the French and Spanish, from 1779 to 1783; and the siege of Port Arthur by the Japanese in 1904.

Siemering, *Ze' me ring,* **Rudolf** (1835-1905), a German sculptor, born at Königsberg. His chief works are portrait statues, and include the following: *King William,* at Berlin; *Frederick the Great,* at Marienburg; *Frederick William I;* an equestrian statue of William I; and a group representing Ste. Gertrude. A memorial of George Washington, executed by him, is in Fairmount Park, Philadelphia.

Sienkiewicz, *Shen kya' vich,* **Henryk** (1846-1916), a Polish novelist, born in the Province of Siedlce, Russian Poland. He studied philosophy at the University of Warsaw and published his first novel, *Nobody is a Prophet in His Own Country,* in 1872. Four years later he visited America and described his experiences in California in accounts to the *Polish Gazette* (Warsaw), under the pen name of Litwos. *Quo Vadis,* his best-known novel, appeared in 1895; it is a study of Roman life during the time of Nero, and the remarkable powers of realistic description it revealed brought the author great fame and caused translations of the work into over 30 languages. Of superior literary merit are the novel, *With Fire and Sword,* and its sequels, *The Deluge* and *Pan Michael.* Mysticism and romanticism color his work, and detract from the merit of his romances as historical novels. In 1905 he received the Nobel prize in literature. He also wrote *Without Dogma, The Knights of the Cross* and *On the Field of Glory.*

Sierra Leone, *Si er' a Le o' ne,* a British colony of West Africa bounded on the w. and n. by French West Africa, on the e. by Liberia and on the s. and s.w. by the Atlantic Ocean. It has an area of 31,109 sq. m., including several islands that form a part of the colony. Near the coast the surface is flat, but farther inland are rugged hills of considerable height. Many rivers traverse it and render the soil fertile and well watered. Aside from the exports from the extensive forests, Sierra Leone produces rice, maize, yam, plantains, sugar, coffee, indigo, ginger, cotton, coconuts, tropical fruits, pepper, rubber, copal, ginger, hides, ivory and beeswax. Sierra Leone has been a British colony since 1787, but its present status dates from 1896. Its government is administered by a governor aided by a Legislative Assembly and an Executive Council. Population, about 75,572.

Sierra Madre, *Mah' dra,* the name of the chief mountain ranges of Mexico, which form the eastern and western boundaries of the great central plateau of that country. The eastern range is known as the Sierra Madre Oriental, and the western, as the Sierra Madre Occidental. Some authorities do not consider these mountains to form a part of the Rocky Mountain system, as is generally supposed. The eastern range has an elevation of from 1000 to 2000 ft., and its lower slopes support a luxuriant vegetation. Some of the great volcanic cones of the country are in this range. The western range is generally more rugged and rises from 8000 to 9500 ft.

Sierra Nevada, *Ne vah' da,* **Mountains,** a short but lofty range of mountains of southern Spain, ranking in height next to the Alps. They extend in a northeast and southwest direction and separate the rivers of the Mediterranean from those of the Atlantic. The highest peak, Mulhacén, is 11,500 ft. high and is but 20 m. from the ancient city of Granada. The southern, or coastal, slopes of the Sierra Nevadas are abrupt, but the inland slopes rising from the Valley of Andalusia are fertile and covered with orchards and forests. The name means snowy range and refers to their snow-capped summits.

Sierra Nevada Mountains, a range in California extending along the eastern border of the state from Tehachapi Pass, at the south, to the southern part of Oregon. They have an average width of 70 m., and contain numerous lofty peaks, the most important being Mt. Whitney (14,898 ft.), Fisherman Peak (14,448 ft.), Mt. Corcoran (14,093 ft.) and Kaweah Peak (14,000 ft.). Among the many deep valleys of the Sierra Nevadas is Yosemite Valley, famous for the grandeur of its scenery. Several passes traverse the range, including the Truckee, the San Joaquin and the Tehachapi. With their summits covered with perpetual snow and their valleys bounded by almost vertical walls of rock, the Sierra Nevadas present a type of scenery of surpassing grandeur.

Sif'ton, Clifford (1861-), a Canadian statesman, born in Ontario and educated in Victoria University. He practiced law at Brandon, Manitoba, where he was solicitor for the city and for the Western Judicial District. A Liberal, he sat for North Brandon (local) from 1888 to 1896, meanwhile, in 1891, becoming attorney-general in the Greenway administration. Also, he was acting premier of Manitoba from 1895 until he joined the Laurier administration in 1896 as minister of the interior and superintendent-general of Indian affairs. This position he held until his withdrawal in 1905, and while he was minister of the interior he carried out a vigorous immigration policy which greatly increased the population of Canada. Being returned meanwhile for Brandon, he sat in the House of Commons until 1911.

Sigel, *Se' gel,* **Franz** (1824-1902), an American soldier, born in Baden, Germany. A veteran of the German Revolution of 1848, he went to England, and in 1852 came to America, teaching mathematics in New York, becoming major of a regiment of state militia and in 1858 removing to St. Louis, where he became superintendent of public schools. In 1861 he entered the Federal army, organizing a regiment of infantry and a battery, and bearing a conspicuous part at Pea Ridge, Bull Run, in the Valley of the Shenandoah and at Maryland Heights. Meanwhile he had been promoted major-general. He resigned his commission in May, 1865, and thereafter was a prominent citizen of New York City. He served as collector of internal revenue, register and pension agent, and contributed to the press.

Sig'nal Corps, *Kore,* a branch of the United States army organized to send and receive messages. The corps is under the command and direction of the chief signal officer, who has the rank of brigadier-general, and whose duties include the provision and care of all instruments and books, everything, indeed, pertaining to military signaling. Men are enlisted for the corps at the discretion

of the chief signal officer of the army, by whom they are promoted or reduced, in accordance with legal provisions. They are distinguished from the infantry by an orange stripe on the uniform. A signal corps system was provided not long before the Civil War, and the advantages derived from it were decided. Since 1891 the signal corps and the weather bureau have been separated.

Modern methods of warfare, by which lines of battle are sometimes extended for miles, make the signal corps of great importance. A school for signal officers and men, for both army and navy, is maintained by the United States Government at Ft. Riley, Kan. See SIGNALING.

Sig'naling, communication by signals. This form of communication is very ancient, especially that by means of fires. In modern times use is made of flags, the heliograph (flashing sun rays by means of a movable mirror), the heliostat (with a stationary mirror), the collapsing drum, the balloon and the semaphore, by day; by night, use is made of signal fires, rockets, lime lights, hand lamps, etc.; both by day and night signals are made by sound of whistle, drum or trumpet. The first flag system was devised by the Duke of York (later James II) of England. In 1795 the United States naval code was adopted, in which a different flag represented each of the 26 letters of the alphabet, but there was no code dictionary until 1816. In 1846 Roger's code was adopted by the navy department. In the United States army the wig-wag system is employed. This is very simple. For day signaling flags two and four feet square are used. The flags are white with a red center or red with a white center, and are attached to light jointed rods. The code is numerical, certain combinations of figures standing respectively for the different letters of the alphabet. The flag has three motions, to the right, to the left and down in front of the signal man. Right and left always mean the right and left of the man operating the flags. A swing to the right means 1, to the left 2, in front 3. Combinations of these movements indicate other numbers. In reading the signals the numbers must be translated into letters; 22 mean A; 12, E; 11, N; 2, T; and so on.

Instead of the flag a torch or light of some kind may be used at night. Every vessel is required to carry at least two expert signal men. The wireless telegraphy has largely taken the place of signals, except in cases where secrecy is desired.

Sign Language. See LANGUAGE.

Signorelli, *Se" nyo rel' lee,* **Luca** (about 1442-1523), an Italian painter, born at Cortona, Italy. He worked principally in Umbria and Florence. His place in Italian art is that of an innovator in the treatment of the nude figure to express emotion. An example of this treatment is the series of frescoes in the Cathedral of Orvieto, representing the *End of the World,* the artist's masterpiece. In addition to their striking treatment of the nude, their terrible boldness of composition, clever foreshortening and elaborate grouping are a tremendous advance over previous accomplishment. Signorelli was one of the first to appreciate the value of the nude as a purely decorative motive, and in this foreshadows Michelangelo, whom he influenced. Other works include scenes in the *Life of Moses* in the Sistine Chapel of the Vatican and eight frescoes representing episodes in the *Life of St. Benedict.*

Sigourney, *Sig' er ny,* **Lydia** (1791-1865), an American author, born (Huntley) at Norwich, Conn. She established a private school for young women at Norwich, and conducted another at Hartford from 1814 until the time of her marriage with Charles Sigourney in 1819. This represented one of the first efforts to provide for higher female education in America. She was also engaged in philanthropic work, contributed over 2000 articles to periodicals and wrote over 50 books, including juvenile and religious literature. Her poems reveal a genuine and intimate love of nature, and she has become known as the "American Hemans." At times her prose style is didactic, seldom ranging above

the commonplace. Among her works are *Letters to Young Ladies, Water Drops, Voice of Flowers, Traits of the Aborigines of America, Man of Uz and Other Poems, Letters of Life, The Faded Hope, Pleasant Memories of Pleasant Lands* (a record of her tour to Europe) and *The Daily Counsellor.*

Sigsbee, *Sigz' by,* **Charles Dwight** (1845-), an American naval officer, born in New York. His first active service was in the Battle of Mobile Bay, which took place in 1864, the year following his graduation at Annapolis. In 1897, having attained to the rank of captain, he was given command of the battleship *Maine,* a position which he held at the time of its destruction in Havana Harbor the following year. During the Spanish War he commanded the battleship Texas. In acknowledgment of his work and ability he was afterward appointed to various positions of responsibility in the naval service. In 1903 he was advanced to the rank of rear-admiral.

Sigurd, *Ze' goort.* See NIBELUNGENLIED.

Si-kiang, *Se'-kyahng',* or **Hong-kiang,** a river of China. It rises in the Province of Yunnan, flows east and southeast and enters the Chinese Sea near Canton. Its length is about 900 m., and it is now navigable most of the way. It has numerous tributaries and enters the sea by a number of mouths.

Si'las, a New Testament character, selected by the apostles and elders to accompany Paul and Barnabas to Antioch with the decree of the Council (*Acts xv*). He also accompanied Paul on his tour to the churches of Syria and Cilicia, and with Paul witnessed the conversion of the jailer at Philippi (*Acts xvi*). Silas is mentioned several times in the Pauline Epistles.

Silesia, *Si le'shi a,* a section of Europe formerly including the southeastern extremity of Prussia, lying between Poland and Bohemia, called Upper Silesia, and a small section north of Moravia in Austria, called Lower Silesia. The Treaty of Paris gives a large part of Upper Silesia to Poland, namely that part mainly Polish in ethnology. A large portion still belongs to Prussia.

Silesia has always been noted for its mineral wealth. Coal is produced in great abundance. There are fifty-six mines in Upper Silesia alone, and nearly all of the Teschin District in Lower Silesia is underlaid with coal. Upper Silesia produces as much zinc as all the rest of Europe. Copper, Cobalt and the rare metal cadmium are also mined. Mining and iron manufacture is the principal industry. There are manufactories of cotton, linen and woolen goods, as well as beet sugar refineries. Agriculture is the principal industry in the plain section to the north and east of the Oder. All the usual crops are raised. Sugar beet raising is very prominent.

It was the success of Prussia in wresting from Austria Upper Silesia in the wars of the Austrian Succession, under the lead of Frederick the Great, that started Prussia in her ambitious career.

Silica, *Sil' i ka,* an abundant compound of silicon and oxygen known in many forms. The most common form is quartz, a clear, glasslike crystal, hexagonal in form and capped by a six-sided pyramid (See QUARTZ). Ordinarily, silica is not soluble in water and can be acted upon only by hydrofluoric acid. It can be melted only at the highest temperatures, and then forms a transparent, watery liquid.

Silicon, *Sil'i kon,* the most widely distributed element next to oxygen, but never found in nature uncombined. It is a constituent of most rocks, of clays, sand, quartz, flint and rock crystals and of a few more precious stones. It is taken up by plants and gives brittleness to the stems of grasses and the veins of leaves. Taken up by animals, the plants give up their silicon to become a part of the hair and nails of higher animals, the quills of birds and the shells of many Protozoans. Silicon is produced in the laboratory in two forms: a soft, red-brown powder, easily oxidized, and a brilliant, steel-gray crystalline substance which oxidizes only with great difficulty.

Silk, a fiber produced by a number of insects, usually in the form of cocoons; specifically, the fiber of commerce produced by the silkworm of China, which belongs to a family of the Lepidoptera group of insects. See LEPIDOPTERA.

THE MOTH. The silk moth is of an ashy-gray color, with a body, in the male, less than one-half inch in length; it is a little longer in the female. The wings are white with black lines running parallel with the border. They are short and weak, and, when extended, measure about two inches across.

PRODUCTION OF THE FIBER. The silk moth is raised by cultivation, and the silk is obtained from the cocoons spun by the silkworms. The species from which the best fiber is obtained produces but one brood a year. Some species, however, produce two, and others more than two broods a year. When the moths emerge from the cocoon they mate. The males are then destroyed, and the females are kept in a darkened room until they deposit their eggs, which is from four to six days. Each insect lays about 500 eggs. The eggs are placed on pieces of paper or muslin and are hatched by artificial heat. The room in which they are kept must be scrupulously clean and well ventilated. The worms appear in eight or ten days. When hatched, the worms are very small, being about a quarter of an inch long. Their color is nearly black. The young worms are covered with coarse muslin or paper, perforated with numerous holes. Upon this, finely chopped young mulberry leaves are placed. The worms work their way up through the meshes in the cloth or the holes in the paper and begin to feed upon the leaves.

The worms grow rapidly for about four weeks, during which period they usually molt four times. They eat voraciously. It is estimated by competent authority that 35,000 worms will consume a ton of mulberry leaves from the time they hatch until they spin the cocoons. The mature silk worm is from three to three and a half inches long and of ashy-gray or cream color, and is slender in comparison with the caterpillars of most moths. The silk comes from two glands, which extend along the sides of the worm its entire length and communicate with minute openings in the under lip, which form the spinneret. As the worm approaches maturity these glands become filled with a clear viscous fluid, which hardens on exposure to the air.

When ready to spin its cocoon, the worm ceases feeding, and if left to itself will sew two leaves together and spin the cocoon between them. In cultivation, however, the worms are placed in racks containing walls just large enough for the cocoon. In spinning, the worm holds itself in position with its hind legs and attaches the fiber to the walls of its cell by moving its head about in all directions. The fiber consists of two minute strands which join together side by side as they issue from the spinneret. It takes about three days to complete the cocoon, which contains from 800 to 1200 yards of fiber. From two to three weeks after the completion of the cocoon the matured insect is ready to escape. To prevent this the pupæ are killed either by dry heat or steam.

RAW SILK. Raw silk is obtained by winding the fiber from the cocoons, a process which requires great care and a remarkable delicacy of touch. The fiber is so fine that fibers from several cocoons must be combined to form a strand of raw silk. The cocoons are placed in a tank of water whose temperature is kept from 145° to 160° F. This is necessary to soften the gum which holds the fiber firmly in place on the cocoon. At first the cocoons are stirred with a brush of fine twigs to remove the outside fiber or waste which adheres to the brush. When the gum holding it in place is melted, the girl attending the cocoons then finds the end of the fiber suitable for winding, combines the fibers of several cocoons, and runs them through an eye and then onto a reel which has a slow motion. As soon as the fiber of one cocoon is exhausted, that from an-

other is joined so that the process is continuous and the strand is kept even. When enough fiber has been wound to form a hank this is removed from the reel, dried and twisted ready for shipment. It takes from 130 to 140 lb. of fresh cocoons to yield 12 lb. of raw silk properly reeled.

MANUFACTURE. Raw silk is still too fine for spinning or other use, and it is subject to a series of operations known as *throwing,* which consists of reeling, twisting, spinning and cleansing the fiber until a yarn suitable for weaving is produced. Silk is woven into fabrics the same as other fibers, but special machinery suited to the silk fiber is necessary. See WEAVING.

PRODUCTION. China, Japan, India, Italy and the southern part of France are the chief silk-producing countries. The conditions to successful cultivation of the silkworm are a soil and climate suitable for the production of the white mulberry tree, and cheap labor. In the United States the production of silk, which would otherwise be successful, is not profitable because of the expense of labor, but the country is one of the leading silk-manufacturing countries, raw silk and thrown silk being imported for the purpose. The annual output of silk goods amounts to about $197,000,000, and the industry requires the employment of 100,000 people.

Silk, Artificial, a product made to resemble silk, and used to some extent as a textile. It is prepared chiefly from cotton and the pulp of soft woods. Cotton is carefully carded and afterwards treated with a mixture of nitric and sulphuric acid, by which it is converted into nitrocellulose having a clear, blue color. It is then pressed and carefully washed, when it is dissolved in a preparation of ether and alcohol. After standing for a few weeks it is run between steel rollers and then forced through tubes into diluted nitric acid. This causes minute streams of collodion to be converted into fibers. These fibers are wound on reels and dried, and are subjected to a variety of washing and drying processes; afterwards they are spun like pure silk. While this product is lustrous and resembles pure silk, it is not so durable, but it can be produced at about one-third the cost of silk.

Silk'worm". See SILK.

Sil'liman, Benjamin (1779-1864), an American scientist, born in North Stratford (now Trumbull), Conn. He was graduated from Yale, where he tutored and later became professor of chemistry and natural history, meanwhile, in 1802, being admitted to the bar. Having studied his chosen sciences under Dr. Woodhouse of Philadelphia for two years, he delivered at Yale in the winter of 1804-1805 his first full course of lectures. Later he studied and traveled in England, Scotland and Holland, and on his return made, in a part of Connecticut, what is thought to be the first of the geological surveys in the United States. In 1818 he founded the *American Journal of Science and Art,* of which for 20 years he was sole editor. Moreover, Professor Silliman lectured on chemistry and geology in most of the large cities of the United States and wrote much on scientific subjects and on his travels, his *Short Tour Between Hartford and Quebec* attracting much notice. In 1853 he became professor emeritus at Yale.

Si'lo, an air-tight tank for storing green fodder and so preserving it for winter use. In the United States the silos are generally cylindrical in form and made of cement or of wood reinforced by hoops. Those of ordinary size are from 10 to 20 ft. in diameter and from 30 to 40 ft. high. They are filled from the top. Because they are air-tight, the stored fodder, known as ensilage, ferments only slightly. Silos were first constructed in France; the first in the United States was that of Manly Miles, who constructed one on his farm in Michigan in 1875. See ENSILAGE.

Sil'ver, one of the precious metals, ranking next to gold in value. Silver is a pure white metal and takes a high polish. It is about 10½ times heavier than

water and is very malleable and ductile. It can be rolled into sheets less than one-ten-thousandth of an inch in thickness and drawn into a wire finer than a hair. It is harder than gold and softer than copper. It is the best conductor of electricity and an excellent conductor of heat. The ease with which silver can be worked, its beauty and its ability to take a high polish make it a very desirable metal for use in the arts. It is extensively used for coinage by all civilized nations. Its next use in importance is for tableware, either in articles of solid silver or in plate. It is used in making mirrors, for ornaments and in silver plating.

Silver is occasionally found free in nature, but the greater part of it is obtained from ore, most of which is highly complex, containing copper and lead in addition to the silver. The treatment of the ore depends upon its composition, and the extraction of the metal is often a lengthy process (See METALLURGY). A large quantity of the silver of commerce is obtained from ores containing lead. Silver forms an amalgam with mercury, and alloys with copper and gold. It has numerous compounds. Silver nitrate or caustic is a compound of silver and nitric acid. It forms large transparent tablets, which turn black on exposure to the air. It is used in medicine as the basis of indelible inks and as an ingredient of hair dyes. Silver iodide, chloride and bromide ore are very sensitive to the action of light and are used in photography. See PHOTOGRAPHY.

Silver sulphide is a black substance and forms on the surface of silverware and other articles exposed to the air because of the sulphur in the air. The sulphur in eggs turns silver spoons black in a similar manner. The coating is easily removed by boiling the articles in soap and water or by silver polishes.

The leading countries in the production of silver are the United States and Mexico, while together they supply about three-fourths the world's output. Some is obtained from Peru, Bolivia and Chile; and in Europe, Spain is the leading country, though valuable mines occur in Germany and Norway. The annual output in the United States averages about $70,000,000.

Simcoe, *Sim' ko,* **Lake,** a lake in the central part of Ontario, halfway between Ontario and Georgian Bay. It is about 30 m. long and about 18 m. wide and the banks are thickly wooded. The lake is frozen enough in winter to be used as a thoroughfare and is the source of the ice supply for Toronto and other cities. It was the scene of the great Indian war in which the Iroquois almost completely destroyed the Huron tribe. The Severn River forms an outlet into Georgian Bay. The city of Simcoe is the most important town on its shores.

Sim'mons College. See WOMEN, COLLEGES FOR.

Simms, William Gilmore (1806-1870), an American poet, novelist and historian, born in Charleston, S. C. He was admitted to the bar in 1827, but soon abandoned the profession to devote himself to literature. The following year he edited the Charleston *City Gazette,* but his editorials against the doctrine of nullification lost him money and the enterprise was later abandoned. He then began to write poetry and novels in great abundance. In 1844-46 he served in the State House of Representatives and received the degree of LL. D. from the University of Alabama. The plots of his novels are historical and the stories are remarkable for insight and vigorous treatment; they show the influence of Cooper and Scott, frequently, however, revealing haste and carelessness. Next to Poe, Simms stands at the head of Southern literature before the Civil War. His poems include *The Lost Pleiad; Atalantis, a Story of the Sea;* and *The Vision of Cortes, Cain, and other Poems.* Among his novels are *Martin Faber, Guy Rivers, Yemassee, The Parisian* and *Eutaw.*

Simonides, *Si mon' i deez,* (556-468 B. C.), a Greek lyric poet, born on the Island of Ceos. He began his career as a poet by directing the Apolline choruses on Ceos, and he was soon called to

Athens, where he won distinction by his superior genius. His hymns, dirges, elegies, epigrams and pæans alike were universally applauded, and by Ruskin and others his epigrams on the great crisis in Grecian history were declared flawless and among the most exquisite literary gems in the world. Added to a melancholy note in all his work is a polished style and a rhetorical finish that places him among the great prophets and writers of the world.

Simoom′, a hot wind, often sand-laden, which blows with greatest intensity in parts of Asia and Africa, where it often reaches a temperature of 130°. Winds of a similar character, though less severe, occur at the time of the equinoxes, in most regions lying near sandy deserts. The desert sands sometimes become heated to a temperature of 200° F. for a depth of several inches, and a temperature like that of an oven prevails in the surface air. Swept by a wind, the fine, hot sand rises until the air is permeated with its dust. The passage of the simoom occupies from six to twelve hours, and persons overtaken by the storm on the desert wastes are saved from suffocation only by covering nose and mouth and lying prone upon the ground. Fierce gusts of winds often carry the sand in drifts, which have been known to bury whole caravans beneath them, or whirl aloft the finer dust particles to such a height they enter the general circulation of the atmosphere.

Sim′plon, the name of a mountain, a pass and a tunnel in Switzerland in the Canton of Valais. The mountain is famous for the road constructed across it by Napoleon, from 1800 to 1806. The summit of the pass is 6590 ft. above sea level. The Simplon Tunnel, completed in 1905, is the longest tunnel in the world, having a length of 12.25 m. It is a double tunnel having a single railway track in each bore.

Sinai, *Si′ ni,* a peninsula, triangular in shape, projecting into the Red Sea, between the gulfs of Suez and Akabah. It has a length from north to south of 140 m.; at its northern end its breadth is about the same. The entire region consists of barren mountains and valleys, the highest peaks being Jebel Katerin, 8537 ft.; Jebel Umm Shomer, 8449 ft.; Jebel Musa, or Mountain of Moses, 7363 ft. Which of these peaks is the Mt. Sinai of the Old Testament, is unknown.

Sin″gapore′, a town and island at the extremity of the Malay Peninsula, the most important part of the British colony of the Straits Settlements. The port is of great value both as a commercial center and as a naval base. As it lies midway between India and China, it forms an important stopping place for ships bound for the Far East. It possesses a good harbor, docks and coaling wharves, and many facilities for shipping. The industrial establishments of the place include a large biscuit factory and a plant for tinning pineapples, while on the Island of Pulau Brani are located the largest tin-smelting works in existence. The chief public buildings include the Roman Catholic and St. Andrew's cathedrals, mosques, temples, the government house, the insane hospital, the law courts and the Hongkong and Shanghai banks. The island is 27 m. long and 14 m. wide, and is separated from the native State of Johor, on the Malay Peninsula, by a narrow strait. On its surface are alluvial deposits, and geologically it is composed of crystalline rocks, sandstones and shales. Population in 1911, 311,985.

Sinn Fein, *Sin Fayn,* a society of Irish nationalists whose sole aim is to overthrow British rule and make Ireland an independent state. In the ancient Gaelic tongue of Ireland, Sinn Fein meant ourselves alone. In April, 1916, an armed rebellion of Sinn Feiners broke out in Dublin, but was put down by the British. The movement did not perish, however, On the contrary, the party gained such strength that it won about seventy seats in the Parliamentary election in December, 1918. The elected delegates refused to take their places in the Parliament at London, but gave their energies to setting up an independent republic with a Parliament at Dublin.

Sin'gle Tax. See TAX, subhead *Single Tax.*

Sing Sing. See OSSINING.

Sioux, *Soo,* or **Dako'ta,** one of the largest tribes of North American Indians. They were said to have lived east of the Alleghenies, but were found by the French in Wisconsin and Minnesota. They gradually scattered over the plains and ceded their lands to the government. Failure on the part of the whites to carry out their agreements brought about Indian massacres in 1857 and 1862. Warfare was continued and in 1876 the United States troops under General Custer were defeated. Sitting Bull, the Indian chief, went to Canada with a large number of the tribe. They now number 25,000 and live on scattered reservations. See SITTING BULL.

Sioux City, Iowa, a city and county seat of Woodbury Co., 100 m. n.w. of Council Bluffs and 156 m. n.w. of Des Moines, at the confluence of the Big Sioux and Missouri rivers, and on the Chicago, Milwaukee & St. Paul, the Great Northern, the Chicago, Burlington & Quincy, the Illinois Central, the Chicago, St. Paul, Minneapolis & Omaha, the Chicago & North Western and other railroads. There is modern local street-car service, and interurban lines extend to the near-by towns and villages. Sioux City is situated in a rich agricultural and stock-raising region and is an important live-stock, industrial and commercial center. The residence portion of the city is attractively situated on high bluffs overlooking the river and the Missouri Valley for many miles. The business portion lies on the bottom lands. There are eight parks with a total of over 900 acres, Riverside, on the Big Sioux River, being the largest. There are a number of boat clubs, a golf and a country club. An interstate fair is held here annually. Two miles south of the city is a monument to Sergeant Charles Floyd of the Lewis and Clark Expedition, who died here in 1804. About one mile west of Sioux City is the grave of War Eagle, a well-known chief of the Sioux tribe of Indians.

Among the noteworthy structures are a city hall, Federal Building, which cost $250,000, the Auditorium, Union Depot, a $400,000 hotel, Y. M. C. A. Building, courthouse, a number of banks, substantial business blocks and office buildings and about 50 churches. The city is the seat of a Catholic see. Sioux City is the seat of Morningside College (Methodist) opened in 1890; also of the Franciscan College for boys. Other educational institutions include a high school, public and parish schools, a public library and a business college. Among the benevolent and charitable institutions are the Samaritan, German Lutheran, Mercy and St. Joseph's hospitals, Boys and Girls Home, St. Anthony's Orphanage and Florence Crittenton Home.

The city contains large grain elevators, lumber and brick yards and packing houses, ranking fifth among the packing centers of the world. The industrial establishments comprise railroad repair shops, harness and saddlery works, foundries and machine shops, tile works, gas-engine works, furniture and paper-box factories, agricultural-implement works, flour mills, sheet-iron works, broom factories, candy and cracker factories, soap-rendering works, a fountain-pen factory, creameries, wagon and carriage factories, linseed-oil works, air-compressor works and clothing shops. Excellent clay for brick and tile is found in the vicinity. The city does a wholesale and distributing business amounting to about $60,000,000 annually.

The first settlement was made about 1849. The town was platted in 1854 and chartered as a city in 1857. During the early years Sioux City was an important military post and was the point where the expeditions for the Black Hills were fitted out. It was also the headquarters of a United States land office. Population in 1920, U. S. census, 71,227.

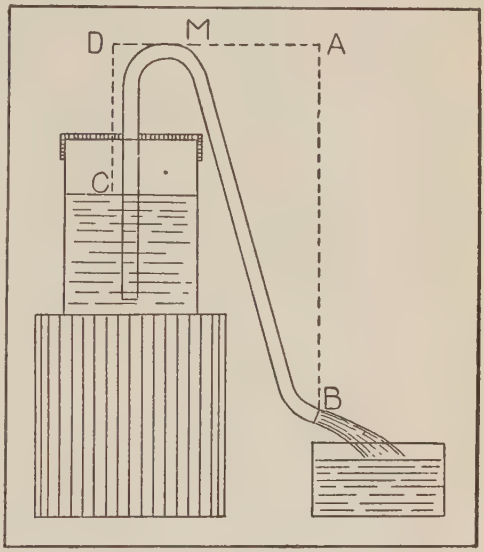
Sioux Falls, S. D., largest city of the state and county seat of Minnehaha Co., on the Big Sioux River and on the Chicago, Rock Island & Pacific, the Illinois Central, the Great Northern, the Chi-

cago, Milwaukee & St. Paul, the Chicago & North Western, the South Dakota Central and other railroads. There is a modern electric railway system. The city owns its own waterworks. There are four parks of over 100 acres, and the river and park scenes are of great beauty. Sioux Falls is one of the most important cities of the Middle West and is noted as a wholesale distributing point and manufacturing center. The most noteworthy buildings include a courthouse, auditorium, Federal Building, Masonic Temple, a Carnegie library, Elks' Club Building, the McKennan and city hospitals, a children's home, many imposing office buildings, fine hotels and numerous handsome churches. There are also many beautiful private residences. Sioux Falls is the seat of the South Dakota School for Deaf-Mutes and of the state penitentiary. The educational institutions include Sioux Falls College, coeducational (Baptist), All Saints School (Episcopal), for girls, the Lutheran Normal School and about 12 city schools.

In the surrounding district farming and cattle raising are important industries. Corn is raised in large quantities, and red granite is extensively quarried in the vicinity. There are also large pork-packing plants, and the manufactured articles include flour, cereals, gasoline engines, brick, farm implements, wagons, mattresses, trunks, cigars, malt, office furniture and fixtures, crackers and confectionery.

The first permanent settlement on this site was made in 1867. A city charter was granted in 1883. It is now operated under the commission form of government. Population in 1910, 14,094. In 1920, U. S. census, 25,176.

Siphon, *Si' fon,* an inverted U tube for removing liquids from vessels. If the tube is filled and one end placed in a vessel containing a liquid, the liquid will flow out as long as the end of the outer arm is below the level of liquid in the vessel. The reason for this movement is that the pressure of the air upon the level of the liquid C is able to sustain a column higher than that from the level to the bend of the tube C D; this pressure forces the liquid beyond the bend whence it flows out the open end, B. The flow will continue as long as A B exceeds C D in length. The air has to be removed from the tube by suction or by filling the tube before immersing it, in order to take away any pressure upon the liquid from air in the tube. If the



SIPHON

tube is filled with liquid, stopcocks at the ends or a finger held over each end should secure it until one end is in the liquid in the vessel. The siphon has been used in fountains, in inventions for removing cream from bottles of milk, and in various instruments for removing liquids from the tops of reservoirs when it was desirable not to disturb the lower part. See BAROMETER; PUMP.

In zoology, the siphon refers to a tube lying between the folds of the mantle of certain bivalve Mollusks. It aids in locomotion and respiration.

Si'ren, an apparatus for producing musical tones whose pitch can be varied and measured. One form consists of a circular disk having numerous perforations through which a current of air, steam or other gas is passed. The rota-

tion of the disks causes a rapid interruption of the current, and this produces the tones. The pitch of the tone is rendered high or low as the disk rotates rapidly or slowly. The siren is used in experiments in sound in physics. The disk may be rotated at such a (measured) speed that the sound produced is of the same pitch as that of another sound that is being studied; then the product of the speed of the disk in revolution per second by the number of holes in the disk gives the required pitch. See SOUND, subhead *Pitch of Sound.*

Sire'nia, a small order of Mammals living along marshy shores in both salt and fresh water. The manatees and sea cows are representative of the group. They are more closely related to the hoofed animals, or Ungulata, than to any others, but in external appearance are more like the seals; unlike the seals, however, they have but one pair of limbs, the forelimbs, and these are short, web-fingered paddles. The head is round with a protruding, somewhat hairy muzzle, obliquely-placed nostrils and no external ears. See DUGONG; MANATEE.

Si'rens, in Greek mythology, two sea nymphs living off the coast of Sicily, who, by their songs, lured to destruction all passing mariners. Ulysses escaped them by filling the ears of his comrades with wax and by being bound to the mast of his ship. Vexed, the Sirens were said to have cast themselves into the sea, where they became rocks. Other accounts make them to have done this because Orpheus surpassed them in music.

Sir'ius, the most brilliant star in the heavens. Sirius is in the constellation Canis Major (Great Dog) and is often called the Dog Star. It forms an equilateral triangle with Betelgeuse in Orion and Procyon in Canis Minor. This star is six times as bright as Arcturus and 13 times the magnitude, and gives 40 times the light of the sun. It is a double star, having a small companion very near it. It is about one and one-half million times the distance of the sun from us and is still going away. See STARS.

Sirocco, *Si rok' o,* a hot wind from the desert, experienced chiefly in Italy and Sicily and other countries to the west bordering on the Mediterranean. It is sometimes dry, with clouds of dust; but in Spain, Italy and Sicily the hot winds from the Sahara, after crossing the Mediterranean, become laden with moisture and are very oppressive, often causing heavy rainfall. These winds always blow from low latitudes to higher and are analogous to the hot winds of the central and eastern parts of the United States, and to the Zondas of the South American pampas, the latter of which blow from the equator and therefore from the north.

Sisal, *Se sahl',* a fiber-bearing plant of the Amaryllis Family, often called sisal hemp. It is a plant closely related to the century plant, or American aloe, which also produces a fine quality of fiber. The fiber of these plants is obtained from the curving, swordlike leaves, which grow in a stemless cluster about the base of the flower stalk. To prepare the fiber for ropemaking, the leaves are cut at the end of the third or fourth year of their growth; they are then passed through a machine which tears the fibers apart, and, after the pulp has been washed away, these are dried and bleached in the sun. Sisal is a hard, yellowish-white fiber, next in value to Manila hemp, in making rope. The plant is successfully grown in the West Indies, Mexico and East Africa, where the soil is dry and contains limestone. One variety of sisal is commonly known as henequen.

Sisyphus, *Sis' i fus,* a fabulous King of Corinth. He is characterized as a tyrant, but is considered to have promoted commerce and navigation. Because of his wickedness he was sentenced in the lower world to roll a heavy stone to the top of a hill. The stone always rolled down again, and thus his punishment had no end.

Sit'ka, one of the chief towns of Alaska, on the west coast of Baranof Island, 1130 m. n. of Seattle and 160 m. s.w. of Juneau. It is the seat of a naval

station and of a government and a Presbyterian training school. The Russian Greek Church is the most interesting building. There is an agricultural experiment station here and a marine hospital. The chief industries are canning salmon, lumbering and mining. Sitka is the old Russian capital of Alaska, and continued as the capital of the territory until 1906, when the seat of government was transferred to Juneau.

Sit'ting Bull (1837-1890), a chief and medicine man of the Dakota Sioux Indians. He commanded the Indians in massacres of the whites during the Civil War, in 1876 and again in 1890. He once made his escape to Canada, but surrendered to General Miles in 1881 and returned to the United States. In 1889 the Indian lands had been ceded to the whites, and general dissatisfaction arose. In 1890 a fresh Indian insurrection broke out. Sitting Bull was captured by Indian police and soldiers on Grand River on Dec. 15, 1890. He attempted to prevent his arrest, but was killed while several of his companions were making an effort to rescue him. See Sioux.

Sixtus, *Siks' tus,* the name of five popes. Sixtus IV and Sixtus V were the most noted. Sixtus IV was pope from 1471 to 1484. During his reign the famous Sistine Chapel in the Vatican and the Ponte Sisto were completed. He was also well known as a patron of art and learning.

Sixtus V was pope from 1585 to 1590. He was a man of remarkable administrative ability and an able financier. Upon his accession he found the treasury empty, but at his death it held over $3,000,000, which he transmitted to his successor. He suppressed the brigands and mendicants in Italy, greatly enlarged and enriched the Vatican Library and was responsible for the admirable arrangement of its treasures, which is still maintained. He founded the Vatican press, upon which were printed editions of the Vulgate and the Septuagint and other valuable religious works. Although his reign was brief he is considered to have done more for Rome and the Catholic Church than any other pope in an equal period.

Skagerrak, *Sgahg' er rak,* an arm of the North Sea, connecting that body of water with the Cattegat, and separating the southern coasts of Norway and Sweden from Jutland, Denmark. It is about 150 m. long, 80 m. wide and from 30 to over 200 fathoms deep. The bays which indent the Swedish and Norwegian coasts afford good harbors. Violent northwest storms frequently prevail.

Skate, a family of fishes belonging to the order known as Rayfishes. They are peculiar in having a broad, flat body, which, in natural position, is parallel to the surface of the water. The head and body form a somewhat triangular figure, from the base of which the long, slender tail extends. The back, which is of spotted, light brown color, has numerous small spines; the under parts are white. The small, ventrally-placed mouth has curved jaws set with tiny, blunt teeth, adapted for crushing the soft Mollusks upon which the skates feed. The broad flaps upon the side of the body take the place of the pectoral fins of other fish, but the pelvic fins are long and lie underneath the body. The skate lives at the bottom of the Atlantic Ocean but is frequently found relatively near the shore between Maine and Virginia and in scattered regions of the Pacific. Fishermen call it the bonnet or the tobacco box. The eggs are tough-shelled, square bodies with a long streamer at each angle, and their empty cases, which are from three to eight inches in length, when found floating along the shore are called mermaids' purses. The skate is not used as food in America but is valued in London and by the French and Italians.

Ska'ting, a winter sport popular in all lands where ice is found, and of great antiquity; and, since roller skates have been perfected, a spring and autumn sport for those who have access to large, smooth surfaces of cement, asphalt or other material. The ice skates of very early times had runners of bone, but

later were made with a wooden foot rest and iron runner. Steel subsequently displaced iron; and many now prefer that the entire skate shall be of metal and adjustable, as the shape of the shoe may require, by the use of metal clamps. Many different styles are now obtainable. The racing skate of today has a long, straight blade, or runner, and is permanently attached to the shoe used for skating. National and international contests in both roller and ice skating have become a feature of modern life. Though covered skating rinks are often provided, both are largely open-air sports; hence they contribute in no small degree to the better physical development of both sexes. In 1910 the world's records for ice skating were as follows: for 500 meters, 44.8 seconds; for 1000 meters, 1 minute, 31.8 seconds; and for 1500 meters, 2 minutes, 20.6 seconds.

Skeat, *Skeet,* **Walter William** (1835-1912), an English philologist, born in London. He did much to popularize our older literature, his editions of *Chaucer* and *Piers the Plowman* being especially valuable. He also edited various other books for the Early English Text Society. As one of the founders of the English Dialect Society, he published his principal work in pure philology, the *Etymological English Dictionary.*

Skel'eton, the frame of an animal body. Skeletons are of two classes, those on the exterior known as the exoskeleton and those within known as the endoskeleton. The hard crustaceous covering of a crab or lobster and the shell of a shellfish are good examples of exoskeletons. The endoskeleton is the one we commonly think of when the term *skeleton* is mentioned.

The human skeleton of an adult contains 200 bones and is divided into the axial skeleton and the appendicular skeleton.

The Axial Skeleton. The axial skeleton consists of the vertebral column or spine, the skull, the sternum and the ribs. In man of average height, the vertebral column is about 28 inches long. It consists of 33 bones grouped as follows: seven cervical, or vertebræ of the neck; twelve dorsal, of the thorax, to which the ribs are attached; five lumbar, five sacral and four coccygeal. The sacral and the coccygeal vertebræ are separate in childhood, but those of each group consolidate into a single bone in the adult, forming respectively the sacrum and the coccyx. There are 24 ribs. The skull has 22 bones. See Skull.

The Appendicular Skeleton. The appendicular skeleton consists of the bones of the extremities. It is divided into the shoulder girdle and bones of the arms, and the pelvic girdle and bones of the legs. The shoulder girdle consists of the scapula, or shoulder blade, and the clavicle, or collar bone. The arm contains three long bones: the humerus, extending from the shoulder to the elbow; the ulna and radius, extending from the elbow to the wrist; eight carpal bones in the wrist, five metacarpals in the hand and 14 phalanges in the fingers. The pelvic girdle consists of the innominata, or the two innominate bones, one on each side joined to the sacrum, and joining each other at a median line in front. The bones of the leg are the femur, or thigh bone; the tibia and fibula, extending from the knee to the ankle; the patella, or knee cap; seven tarsal bones in the ankle; five metatarsal in the foot; and 14 phalanges in the toes. See Cartilage; Joint.

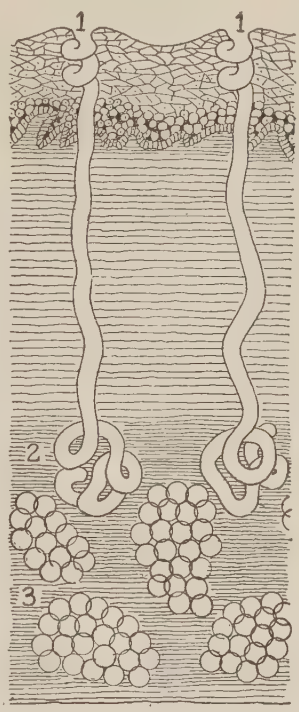
Skep'ticism (from Greek *skeptikos,* reflecting, doubting), a name used in general to denote mental doubt or suspense of judgment. In theology, it is used to characterize doubt with reference to religious truth or authorized doctrine. In philosophy, it has a more specific meaning; namely, systematic doubt or denial of the possibility of objective knowledge. It rests upon philosophic views of the validity of knowledge. Its fundamental basis is in the theory that knowledge arises from sensations that have a purely subjective value and can authenticate no objective reality. In antiquity the Sophists were the most noted representatives of philosophic skepticism. In modern times David Hume is its fore-

most advocate. As a preliminary stage in the development of thought, skepticism has often rendered helpful service, as with Descartes and the transition from Hume to Kant. As a final conclusion in philosophy, however, the human mind has never been content to accept it as adequate.

Skiing, *Ske' ing,* a winter sport in the north of Europe, Canada and the United States. The ski, or Scandinavian snowshoe, is a slat, usually of hard pine or ash, somewhat wider than one's foot, a quarter of an inch thick and from six to ten feet long. These narrow to a point at the toe end, and are turned slightly upward so as to slip over small obstacles. The foot is held in position by a thong, or binding, and sometimes a heel strap is also used. A groove along the middle of the under surface prevents slipping sideways. In skiing one carries a strong stick with a wheel at one end. This serves for steering when sliding down steep places. Covering a portion of the under surface with fur makes climbing easier, and is not uncommon. Contests include long-distance runs, short runs at high speed and long-distance jumping from a *take-off* on a hillside, following which the contestant must land safely and continue on his skis to the bottom of the hill.

Skin, the outer covering of the body. It is composed of two layers, the epidermis, or outer skin, and the dermis, or under layer. The epidermis protects the dermis from innumerable contacts with the outer world. It is made up of a multitude of minute cells, held together by a small amount of cementing substance. Its surface is marked by ridges and furrows, caused by the pores and intersecting lines, ridges and furrows. It is thicker in the palms of the hands, soles of the feet and on the back than in other parts of the body. Its ordinary thickness can be judged in the case of blisters, which are accumulations of liquid between the epidermis and the dermis. The pigment which supplies the tint of individuals and of races lies in the lower cells of the epidermis.

The dermis, or true skin, is made up of a dense network of elastic and white fibrous tissue and contains nerves, glands and hair follicles carrying the hair roots. On its upper surface are minute elevations called papillæ. They contain the end organs of the nerve of touch and have been estimated to be 64,000 to the square inch in those parts where this sense is most acute. The dermis is supplied with blood vessels which help to renew the skin and carry off impurities. Through it pass the sebaceous glands and sweat glands. The sebaceous glands are embedded in the fatty meshes of the areolar tissue beneath the skin, from which their ducts convey a lubricating liquid which keeps the outer skin pliable. They are always present at the roots of the hair and serve to make the hair soft and silky. In the illustration, 1 and 1 represent pores; 2, sweat glands; and 3, fat in the meshes of the dermis. The sweat glands are largest and most active on the brow, the soles of the feet and in the palms of the hands. There are about 2,500,000 on the body.



SKIN

The continual flow of sweat carries waste material to the surface, where its constant evaporation regulates the temperature of the body. Thus the skin has four important functions: it protects the rest of the body from the harsh contact

with the outer world; regulates bodily temperature; carries off waste material; and serves as a sensory end organ. The oily secretion from the sebaceous glands and the solid residue left by evaporating sweat form a coating over the surface, which tends to choke the pores or openings of the glands. For this reason the daily bath should never be neglected by normally healthy persons, as open pores are necessary not only to the maintenance of health but to the continuance of life itself.

Skink, a family of widely differing lizards found in the United States from Massachusetts south to Texas, and in Central America, Asia, Africa and the Pacific Islands. All are swift runners, though they differ greatly in their manner of running, for some have only forelimbs, others only hind limbs; some have four well-developed limbs, and others, which can scarcely be said to run, have no visible limbs at all. Their bodies are always covered with large, round scales of glossy luster, and their tongues are long and slightly forked at the end. One species, known as the five-lined skink, has, when young, five yellow lines upon its black back. This color darkens with age, and the animal has finally an entirely black coat. See LIZARD.

Skip'jack". See CLICK BEETLE.

Skull, the bony framework of the head. It may be divided into two parts: the cranium, which covers the top, sides and back of the head cavity, protecting the brain; and the bones of the face. The cranium is composed of eight bones, which constitute an unbroken wall which resembles the surface of a hemisphere with its flat side turned downwards. The bones of the skull are: one occipital bone, which lies at the back of the skull and forms a part of its base; the frontal bone, which forms the forehead; two parietal bones which meet at the crown of the head and constitute a large part of the roof and sides of the skull; two temporal bones, one on each side in the region of the ear; the sphenoid bone, situated between the temporal and below the frontal bones; and the ethmoid bone, continuous with the sphenoid, which forms a partition between the brain and nose cavities. The face bones are 14 in number: one inferior maxilla, or lower jaw bone; two maxillæ, upper jaw bones; two palate bones, situated back of the hard palate and in front of the nasal passage; two nasal bones, forming the bridge of the nose; one vomer, which forms the partition between the nostrils; two malar, or cheek, bones; two inferior turbinates, which lie on the outer side of each nostril chamber; and two lachrymals between the eye socket and the nose. The lower jaw bone and one of the small bones of the ear are the only movable bones of the head. See SKELETON.

Skunk, a common member of the Weasel Family, many species of which are found throughout the United States. It is a stout little animal with pointed nose, arched back and a peculiar mincing gait. Its size is about that of a house cat. The fur is long, thick and sleek, and marked with a pure white stripe which extends from the nose along the back of the neck in a widened streak and divides, leaving a wedgelike spot of black on the back. The tail is black above but white underneath, and bushy. The skunk lives in a burrow, hollow tree or underneath sheds and barns, whence it issues at night to feed upon insects, gophers, mice, squirrels, eggs and poultry. Because of the disagreeable odor of a secretion formed in certain glands and emitted at will as a defense, and because it occasionally attacks chicken yards, the skunk has earned a hard name which it really little deserves; the animal is a great friend to the farmer, because it destroys innumerable insect and Rodent pests which would not otherwise be driven away from the grain and fruit. The fur of the skunk, purified by heat, is sold under the name of American sable, or marten.

The striped skunk of the South and the Texas white-backed skunk are smaller animals than the common skunk, but no less beautifully marked.

Skunk Cabbage, one of the earliest spring plants, a member of the Arum Family. The pointed coil of leaves

pierces its way to the surface of the ground before winter has fully gone, and in front of it appears, almost as soon, the closely wrapped spike of blossoms. The covering which envelops the flower is called the spathe and in color is mottled green and purple. The spike, upon the base of which the flowers grow, is called the spadix. The flowers have no petals and are lavender and yellow in color. The plant has a heavy, unpleasant odor which attracts the insects needed to assist in fertilizing the flowers. Skunk cabbage grows in boggy ground as far west as Minnesota and south to Georgia.

SKUNK CABBAGE

Skutari, *Skoo' tah ree,* a city of Albania, situated near the southeast extremity of Lake Skutari and on a navigable stream, the Bojana, which flows into the Adriatic Sea. Near the town is a strong citadel. The industries are comparatively unimportant. In the Balkan War, 1912-1913, Skutari was captured by the Montenegrins, but after a prolonged controversy they were compelled to surrender it to the great powers, England, France, Germany, Russia and Austria-Hungary. Population, about 20,000.

Skye, *Ski,* **Island of,** the second largest of the Scottish islands and in position the most northerly of the inner Hebrides. A narrow channel separates it from the mainland and from the County of Inverness, of which it forms a part. The total area is 535 sq. m. The Coolin Hills, culminating in the lofty peaks of Scoor-nan-Gillean, form a bold and rugged irregular line across the island from southwest to northeast, and sheep and cattle raising is resorted to, as the island is not suited to agriculture. The principal castles are Armadale and Dunvegan, and Portree, a village of 2798 souls, is the principal port. Population, chiefly Celtic and Norse, about 15,000.

Skye Terrier, a small terrier known chiefly as a household pet. It is of Scottish breed but differs from the Scotch terrier by having a short, woolly, inner coat and a longer straight coat of hair which hangs down its sides and over its eyes; its color is generally silvery or yellow-white. The ears and tail are also covered with silky hair. The eyesight of this terrier is poor, and if the hair about the eyes is clipped the sight becomes worse and the eyes sore and inflamed. In habit the Skye terrier is sleepy and indolent but affectionate. Its name comes from the Island of Skye, where it was first bred.

Sky'lark", a bird of the Lark Family. This famous songster is about the size of the robin. Its upper parts are light brown, streaked with black, and the under parts are whitish; the neck, sides and breast are reddish, spotted with brown. The outer tail feathers are white. The nest is made in the ground in meadows and contains three to six brown-spotted eggs. The skylark is found mostly in meadows, where it feeds on seeds, as well as on insect larvæ. It does not perch, but when not on the ground, soars high in the air, singing as it flies. It inhabits all of Europe, northern Africa and Asia, and has been introduced into the western part of the United States.

The melodious singing of the skylark has long been a favorite theme in song and story, and is the subject of a famous painting, *The Song of the Lark,* by the French artist Jules Breton. No one has written more beautifully of this wonderful songster than the poet Shelley. The opening lines of his famous ode ring with the joy and life that the skylark seems to express with its singing:

Hail to thee, blithe spirit!
Bird thou never wert,
That from heaven, or near it,
Pourest thy full heart
In profuse strains of unpremeditated art.

Slag, a compound formed by the action of heat in the processes of extracting metals from their ores. It consists chiefly of silica, with alumina or lime, or both, together with a number of other substances in small quantities. It has a glassy appearance, due to the silica, and always contains a small quantity of the metal from which it is extracted and from which it gets various colors. Slag has been used to impart a glaze to bricks, and an iron slag is sometimes used for making vases, match safes and similar small articles.

Slan'der. See LIBEL.

Slate, a hard, fine-grained rock, which has been produced, through geologic transformation, from shale or clay. It cleaves or splits readily into slabs and thin sheets and has great durability and resistance. It is used for roofing, school blackboards, slate pencils and whetstones. The largest quarries are in Pennsylvania, New York, Vermont and Quebec, from which the product is shipped to South America, China and Australia. There are smaller quarries in other parts of North America and in Wales, France and Scotland.

Marbleized slate, slate used for mantels, is made by first japanning the slate, then dipping it in a tank of water on whose surface paint has been spread in such a manner that when it adheres to the slate it gives it the appearance of marble. The paint is then hardened by baking. The annual output of slate in the United States is over $6,000,000.

Sla'ter Fund, a fund of $1,000,000, given in 1882 by John Fox Slater, of Connecticut, for the promotion of education among the negroes of the Southern States. By judicious management this fund has been increased to approximately $1,500,000; while the trustees have regularly contributed about $75,000 per annum, largely in assisting worthy students who were preparing to teach, and for the extension of instruction in manual training and agriculture. In 1909 the trustees were aiding the work at some 45 institutions for negroes. They then voted that in future appropriations for the aid of public schools, preference should be given to the building and equipment necessary for industrial work and "in return for a stipulation of annual support." See PEABODY EDUCATION FUND; GENERAL EDUCATION BOARD; NEGRO, EDUCATION OF THE.

Sla'very, an institution in society under which one person is held as the property of another. Slavery is one of the oldest institutions of civilization. The Egyptians and other nations of antiquity were accustomed to enslave the people whom they conquered, and occasionally the enslaved captive was in a position of trust and responsibility in the government. Noted examples are Joseph in Egypt and Daniel in Babylon.

GREECE AND ROME. Both the Greeks and Romans made a practice of enslaving people taken captive in war. People were also enslaved for debt and children could be purchased from free parents and made slaves. Hereditary slavery, however, was not common. Originally in Rome slaves had no rights more than those granted the domestic animals. In Greece they were granted the rights of marriage, religion and personal security and sanctity. Later these rights were granted in Rome, and some slaves became trusted members of the households which they served. They engaged in all trades and occupations and even entered the learned professions, and at one time they were so numerous that uprisings of slaves were not uncommon. These uprisings were put down, but not always without considerable effort. Slaves could obtain their freedom by purchase or other agreement with their masters, and sometimes they were freed as a reward for some meritorious act. With the fall of the empire slavery was gradually merged into the vassalage of the Middle Ages. See FEUDAL SYSTEM; SERFS.

UNITED STATES. Previous to the discovery of America, slavery and the slave trade were thoroughly established in southern Europe and in Mohammedan countries throughout Africa and Asia. The Mohammedans enslaved alike Chris-

tians, heathen, whites and blacks. In the introduction of slavery into America, the early colonists were following an established custom. The Spaniards at first tried to enslave the Indians, but they rapidly succumbed to the treatment, and negroes were substituted. Negro slavery was, therefore, introduced into the New World in 1503, when the Portuguese brought a shipload of negroes to Santo Domingo. Sir John Hawkins was the first Englishman to bring slaves to the New World.

The early English colonies took little interest in the slave trade, though in the 17th century it was vigorously prosecuted by England. The first negro slaves were introduced into Virginia in 1619. While this advent received but little attention at the time, it proved to be an epoch-making event in American history. Industrial conditions in the colonies of the North were such as to render slavery unprofitable. This is the chief reason for the exclusion of slavery from these colonies, and until more than 50 years after the Revolutionary War there was no general opposition to slavery in the North.

The development of slavery in the colonies in the South and later in the Southern States was due solely to economic conditions. At first, growing tobacco was very profitable, and this required an abundance of cheap labor. Gradually the raising of cotton became profitable. Then the invention of the spinning frame and the power loom greatly extended the manufacture of cotton fabrics in England. The cotton gin invented by Eli Whitney in 1793 supplied the missing link between the grower and the manufacturer and made possible the preparation for market of a large quantity of raw cotton with a small amount of labor. This was the greatest stimulus to cotton production in the history of the industry. See Cotton Gin.

The framers of the Constitution recognized the evil effects of slavery and inserted in that instrument a clause prohibiting the importation of slaves after 1808. The old Congress in 1787 had prohibited slavery in the Northwest Territory (See Ordinance of 1787). The census of 1790 showed that there were 700,000 slaves in the United States. Over 40,000 of these were north of the Mason and Dixon's line. New York had over 21,000 and New Jersey over 11,000. Massachusetts was the only state that had none.

Between 1790 and 1830 the number of slaves increased from 700,000 to over 2,000,000. The first great debate in Congress over slavery was in 1820, when the Missouri Compromise was passed (See Missouri Compromise). The breach between the slave and the free states continued to widen until in 1860 with the election of Lincoln the slave states seceded and the Civil War was brought on. As a result of this war slavery was abolished. See Fugitive Slave Law; Kansas-Nebraska Bill; Dred Scott Case; Civil War in America.

Present Condition. Slavery is now abolished in all civilized countries, but it is still practiced to some extent in the South Sea Islands and in the interior of Africa, where Arab slave traders continue to evade to some extent the powers having control of this region.

Slavs, a branch of the Aryan Family inhabiting the eastern and southeastern parts of Europe and the western part of Siberia. In all they number about 140,000,000. The Slavs are a little below the average Aryan height, have broad heads, gray, brown or black eyes, and vary in complexion from a pale white to almost a brown. They are divided into three great groups: the eastern, occupying eastern Russia and Siberia; the northwestern, which includes the Poles, the Kashubes, the High and Low Serbs, the Czechs and the Slovaks; the southern, which includes most of the inhabitants of Servia, Bulgaria, Montenegro, Bosnia and Herzegovina. Each group is subdivided into numerous smaller groups.

Sledge, *Slej,* or **Sled,** a vehicle mounted on runners and used for hauling heavy loads over ice and snow and sometimes over bare ground. In Russia

the sleigh is called a sledge, but in this country the name is restricted to a low vehicle whose frame seldom extends more than two and one-half feet above the ground.

Sleep, a normal condition of the body occurring periodically, in which there is complete or partial abeyance of volition and consciousness due to inactivity of the nervous system. The necessity for sleep is usually indicated by a desire for sleep; and this desire is manifested in such sensations as heaviness of the lids, mental dullness and a general feeling of fatigue. It is nature's method of putting a stop to what might be excessive or extravagant waste of bodily energy. During sleep the energy required for the nonvoluntary acts of respiration and circulation is reduced to a minimum, and the tissues of the body are renewed by nutrition.

The amount of sleep required by different persons is subject to wide variation. The average person sleeps eight hours of the 24, and most physicians recommend this amount, though there are some who advocate more, others less. Brain workers, as a rule, require less sleep than manual laborers, and persons of sprightly or lively temperament require less than others. Ordinarily the amount of slumber needed decreases with the approach of old age. Almost the entire period of infancy is spent in sleep, and with certain diseases the patient sleeps during the progress of the malady, with perhaps short waking intervals.

Among the peculiar phenomena connected with sleep are dreams, or intervals of consciousness during sleep; somnambulism, walking in the sleep; nightmare, in which the sleep is disturbed by nerve-racking dreams. Inability to sleep is designated as insomnia. Some mental states are characterized by abnormal sleep, as, for example, trance sleep and some hypnotic states. See SOMNAMBULISM.

Sleigh, *Slay,* a vehicle on runners used to carry passengers on snow and ice. The sleigh differs from the sledge in being lighter and higher. Some patterns are also highly ornamental and have upholstered seats. The passengers protect themselves from the cold by robes.

Slick, Sam. See HALIBURTON, THOMAS CHANDLER.

Slidell', John (1793-1871), a United States senator, born in New York. He graduated from Columbia College, studied law and, in 1819, went to New Orleans, where he built up a large practice. From 1843 to 1845 he was a member from Louisiana of the lower branch of Congress; in 1845 was sent as United States minister to Mexico, but was not received; and from 1853 to 1861 was United States senator. In 1861 he resigned and the same year was sent as a Confederate commissioner to France. He was captured while crossing the ocean and brought back to the United States, but was released and sailed again for Europe. Although he failed in securing the recognition of the French Government for the Confederate States, he was enabled to make negotiations that proved of great value to the South.

Sling, a device for throwing stones or bullets, used in warfare in ancient times. The sling is made by fastening strong strings at each end of a piece of leather which forms a resting place for the missile to be thrown. The two ends of the string are then held together in one hand and the shot whirled rapidly around and around the head. At the right moment the end of one of the strings is released, and the shot is hurled with great force in the desired direction.

Slocum, *Slo' kum,* **Henry Warner** (1827-1894), an American general, born in New York. In 1852 he graduated from West Point, but after serving in the army four years resigned and began the practice of law in Syracuse. In 1859 he was sent to the State Legislature. At the beginning of the Civil War he became colonel of volunteers in the Union army and commanded a regiment at the first Battle of Bull Run. He was soon made a brigadier-general of volunteers, and in 1862 was promoted to major-general of volunteers. He en-

gaged in the battles of Bull Run, Antietam, Fredericksburg and Gettysburg. In 1865 he resigned from the army and went to Brooklyn, where he resumed the practice of law. From 1869 to 1873 he was a member of Congress. He was several times elected to positions of responsibility in Brooklyn, and in 1883 was once more in Congress.

Sloe, or **Blackthorn,** a thorny shrub or low tree of the Rose Family and much resembling the wild plum; in fact many botanists believe that the wild and garden plums are merely varieties of the sloe. The sloe is a native of Europe but has been cultivated throughout the Eastern States as a hedge shrub and has become wild farther west. The flowers grow singly and resemble the plum in form and color. The fruit is small and black but rather bitter to the taste. In some localities it is used in making preserves, and its juice produces an intense black stain. The wood is hard and fine-grained and is used in making canes and the handles of tools. The leaves, which have the color of tea leaves, are sometimes used as a substitute for, or an adulterant of, tea. Black haw, a glossy-leaved member of the Honeysuckle Family, is also locally known as sloe, probably because of its small black berries. It, too, is a shrub with white flowers, but they are borne in flat-topped clusters and are tubular in form.

Sloth, *Slothe,* a slow-moving, tropical American member of the Sloth Family of Edentata, noted for its peculiar manner of hanging motionless for hours from the limb of a leafy tree or from another's back. Its claws, which have little else to do but to hold it to the tree, are merely hooks, well adapted to their use. The body is covered with long, shaggy hair, peculiar because its color is green and because its tint is due to the presence of a tiny plant which grows in the groove of the hair. This strange coloration which makes the animal, as it hangs from a limb, resemble a thick clump of moss, is its only means of defense. Since its food is leaves, its teeth are fitted only for crushing. The sloth seldom moves and then only slowly, and thus is an easy prey for the animals which abound in the tropical forests. There are two species, which may be distinguished by the difference in the color of the hair, or rather in the kind of fungus growing upon it, and by the number of claws, whether two or three.

Slot Machines, the term by which a large variety of machines are known, because they are operated by putting a coin through a slot. These machines are divided into two classes, one of which contains some gambling device, the other comprising silent, automatic salesmen, operated by a coin placed in the slot. The gambling machines contain various devices, that most commonly employed being a wheel bearing figures, signs or symbols. The wheel is made to revolve by a series of springs set in motion by the weight of the coin or by pushing it through the slot. The sales machines are employed in dispensing various articles, such as postage stamps, matches, chewing gum, candy, nuts, etc., or giving entertainment, like a phonograph, or telling weight by scales.

Slovak'ia, the eastern province of Czecho-Slovakia, being that part of the former kingdom of Hungary known as the northern highlands inhabited by Slovak tribes, a branch of the western Slavs. Their country is very rugged. (See CZECHO-SLOVAKIA.)

Slovenians, a Slavic race inhabiting the part of Jugo-Slavia to the north of Croatia. Their tribes formed a part of the great Slavic invasion of the seventh century and they have since inhabited the section of country where they are now found. Their territory passed under the control of German tribes in the eighth century and formed a part of the duchy of Austria. At the conclusion of the World War, their territory became a part of Jugo-Slavia.

Slug, a family of Mollusca resembling the snails in form and habits. The common slugs are flat, slimy, almost shell-less animals, which live in heaps of decayed matter and are very harmful to gardens and fields. They draw them-

selves along by a muscular contraction of the body aided by a slimy excretion which renders progress less difficult. The eyes are borne upon stalks like those of the snail. Some species of slugs are edible and are sold upon the market in a pickled form. The red slug, gray slug, black slug and field slug are often found under decaying leaves upon the ground. Their movements are slow, and their appearance and mode of life render them the object of general aversion.

Small, Albion Woodbury (1854-), an American sociologist, born at Buckfield, Me. He graduated at Colby College in 1876, at Newton Theological Institution in 1879, and took postgraduate work in Germany and at Johns Hopkins University. From 1881 to 1888 he was professor of history and political economy at Colby College, where he was president from 1889 to 1892. Since 1892 he has been professor of sociology in the University of Chicago. He is also editor of the *American Journal of Sociology*. Professor Small regards sociology as the synthesis of the particular social sciences. He finds the motives of social action in the attempt to satisfy certain fundamental human needs. He has published *General Sociology, Adam Smith and Modern Sociology* and *The Meaning of Social Science*.

Small Arms, weapons of war that may be carried and used by hand. Such arms are inclusive of all such weapons as the blunderbuss, musket, rifle, carbine and all varieties of pistols. The first small arms, which date from about the 14th century, consisted of a small hand cannon fired from the shoulder, called bombardelle; another of this class was the culverin, which was used also for horseback fighting. The term *small arm* is used in contradistinction to machine guns and heavy ordnance generally.

Small'pox", a contagious disease characterized by eruptions which often leave permanent scars. The disease is highly contagious and is communicable by contact or by the breath. It develops from 10 to 14 days after exposure, but in cases of direct infection the time is shorter. The first symptom of the disease is high, inflammatory fever. This is followed after three or four days by an eruption, which appears as small shot beneath the skin. Later the eruption develops into pustules, which break open after the seventh or eighth day, and soon become covered with scabs. The scabs disappear at the end of the third week, leaving dark reddish-brown blotches, which remain several months. When the eruption takes the form of ulceration of the true skin, it leaves the face permanently pitted.

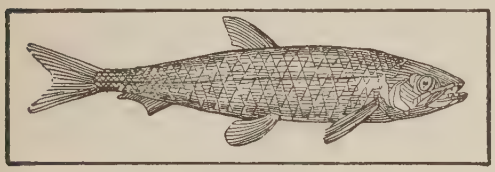
Smallpox was a devastating disease in former times, and about 50 per cent of the cases were fatal. At the present time epidemics of the disease are rare, owing to improvements in sanitation, and such preventive measures as vaccination and isolation. Although vaccination does not always insure immunity, it greatly reduces the power of the germ; and the disease never occurs in malignant form in persons who have been vaccinated. See VACCINATION.

Smell, the sense by which odors become perceptible. The olfactory membrane lines the upper portion of the back of the nasal cavity. It contains the cells in which terminate the olfactory nerves which communicate with the olfactory lobes of the brain (See BRAIN), where the sense of smell is localized. The organs are usually stimulated by the air or other gaseous substance. Dryness and excessive secretion of mucus impairs the sense. The large quantity of mucus in infancy and the mechanical difficulties due to undeveloped nostrils render the sense of smell very obtuse. It is probable that there are no acute perceptions of smell before the age of seven. The sense is believed to have developed later than taste in air-breathing animals. In some of the lower animals smell is keener than in man, though their perception of differences in odor quality is less acute.

Odors are commonly classified as agreeable and disagreeable, though we sometimes designate their quality by reference to the object from which they

come, as pineapple, rose, gasoline, etc. Sometimes odors of similar quality arise from unlike substances and are classified accordingly; as the group of aromatic smells, which come from spices and camphor; fragrant smells of many flowers; nauseous smells, produced by decaying animal matter; and ambrosial smells, which include musk and other perfumes. The sense of smell is greatly reinforced by the sense of taste.

Smelt, a family of long, slender sea fishes, related to the salmon. All have short fins, a forked tail and a dark lateral line. Like the salmon they have a small, fleshy modification of the dorsal fin known as an adipose fin, a structure which is peculiar to these two families. The chief differences between the Salmon and Smelt families are in the size



SMELT

of individuals, the smelt being smaller, and in internal structure, especially of the digestive tract. Almost without exception the smelts are marine fish but they come into fresh water to spawn. A very few are of the landlocked variety; that is, they were probably once marine, but after spawning their return to the sea has by some means been prevented. The smelts are all excellent food fish. The most common is the European species known as the spirling. The rainbow smelt of Alaska and Japan are also abundant, and a smaller species is the whitebait, valued in the West.

Smi'lax, a delicate, twining plant of the Lily Family brought to conservatories in the United States from the Cape of Good Hope. The stem is almost threadlike and bears along it little, flat bodies which are recognized as branches by their structure and arrangement but which closely resemble leaves. Underneath these are the true leaves, tiny, light-colored scales hardly noticed and not generally known to be leaves. From their axils spring two or three greenish-white, fragrant flowers, which bloom in the winter. The berries that follow are green and have three cells, which contain two seeds each. The stems are much used for decoration, being easily festooned and twined.

Smilax is also the botanical name of a family of woody-stemmed plants which climb by means of tendrils. Commonly, however, these plants are called greenbrier, cat brier or China brier and are not often referred to as smilax. They grow in tropical or subtropical countries and are the source of the drug sarsaparilla.

Smiles, Samuel (1812-1904), an English author, born in Haddington, Scotland. He studied medicine at the University of Edinburgh, but gave up his practice later on, to become the editor of the *Leeds Times.* In 1845 he became secretary of the Leeds & Thirsk Railway and from 1854 to 1866 of the South Eastern Railway. At Leeds he came in contact with some of the remarkable men whose biographies he later published as representative lives of the leaders of industry. His books on practical subjects, *Self-Help, Character, Thrift* and *Duty,* were wholesome and stimulating and enjoyed a wide circulation and various translations. In 1878 he received an honorary LL. D. from Edinburgh University, and the Cross of Knight Commander of the Order of St. Sava from the King of Servia in 1897. Among other works are *Life of George Stephenson, Lives of the Engineers, Industrial Biography, James Brindley and the Early Engineers, Lives of Boulton and Watt, Life of Thomas Telford, George Moore, Men of Invention and Industry, A Publisher and His Friends* and *Jasmin.*

Smith, Adam (1723-1790), the father of political economy as a separate branch of human knowledge, born at Kirkcaldy, Scotland. He studied at the University of Glasgow and then went to Oxford for seven years. In 1748 he delivered in

Edinburgh a course of lectures on rhetoric and literature, which introduced him to a circle of learned men, including David Hume, who remained a life-long friend. Smith was appointed professor of logic at the University of Glasgow in 1751 and the following year was transferred to the chair of moral philosophy. His lectures were of great merit and led to the publication in 1759 of his first work, *The Theory of Moral Sentiments,* and, later, his *Essay on the Origin of Languages.*

In 1764 he accompanied the young Duke of Buccleuch in his travels, and during his residence in Paris became acquainted with the prominent men of letters there, who strongly influenced his later thinking. Returning to his native town in 1766, he devoted the next ten years to quiet study, the fruit of which was his great work, *An Inquiry into the Nature and Causes of the Wealth of Nations,* which is the precursor of modern political economy. Its main thesis is that national wealth is best produced by private initiative within the limits of justice. The book made a great impression and has exerted wide influence. It went through five editions during the life of the author and has been translated into the principal European languages. In 1778 Smith was made commissioner of customs for Scotland, and in 1787 was elected lord rector of the University of Glasgow, where he died three years later.

Smith, Charles Emory (1842-1908), an American journalist and politician, born in Mansfield, Conn. He graduated at Union College in 1861 and during the Civil War raised volunteer regiments for the Federal army. He was successively editor of the Albany *Express,* 1865, the Albany *Journal,* 1870, and the Philadelphia *Press,* 1880. From 1890 to 1892 he was minister to Russia and from 1898 to 1902 he was postmaster-general of the United States.

Smith, David Eugene (1860-), an American mathematician, born in Cortland, N. Y., and educated at Syracuse University and in Europe. He taught mathematics in the Cortland State Normal School, in 1891 became professor of mathematics at the Michigan State Normal College, in 1898 became principal of the New York State Normal School and in 1901 was appointed professor of mathematics at Teachers' College, Columbia University. He has done mathematical editing, has lectured at Harvard and has written much on the principles, teaching and history of elementary mathematics. In collaboration he has prepared advanced works on cognate subjects and is the author of a series of arithmetics. He is chairman of the American Commissioners of the International Commission on the Teaching of Mathematics.

Smith, Edmund Kirby (1824-1893), an American soldier, born at St. Augustine, Fla. He graduated from West Point in 1845, fought in the Mexican War under General Taylor and was instructor of mathematics at West Point from 1849 to 1852. At the outbreak of the Civil War he resigned his commission and joined the Confederate army, becoming brigadier-general, serving with Johnston in the Shenandoah Valley and, as major-general, commanding the Department of East Tennessee. In October, 1862, he was promoted lieutenant-general, fought at Murfreesboro, and early in 1863 was made commander of the Trans-Mississippi army, which he finally surrendered to General Canby in May, 1865, at Baton Rouge. Previously, in February, 1864, he had been made full general and had defeated General Banks in the Red River campaign. Following the war General Smith was interested in various commercial enterprises, from 1870 to 1875 was chancellor of the University of Nashville, and then became professor of mathematics in the University of the South at Sewanee, Tenn.

Smith, Francis Hopkinson (1838-1915), an American artist, author and engineer, born in Baltimore, Md. As a contractor he did much work for the Federal Government, and laid the foundation for the Bartholdi *Statue of Liberty* in New York Harbor and for several

lighthouses and life-saving stations. His early illustrations in water colors and charcoal were chiefly the result of sketches done during his summer vacations spent in the mountains and abroad. Mr. Smith received many awards and medals for the excellence of his work. His novels and short stories portray life in the Old South. They include *Col. Carter of Cartersville, A Gentleman Vagabond, The Other Fellow, At Close Range, Col. Carter's Christmas, The Tides of Barnegat, The Veiled Lady, The Romance of an Old-Fashioned Gentleman, Peter* and *Forty Minutes Late and Other Stories.* Among his volumes of travel illustrated by himself are *Old Lines in New Black and White, Well-Worn Roads, Gondola Days* and *The Venice of To-Day.*

Smith, Goldwin (1823-1910), an Anglo-American scholar and writer, born in Reading, England, and educated at Eton and Oxford. In 1847 he became fellow of University College, and for several years entered enthusiastically into the cause of university reform. From 1858 to 1866 he was regius professor of modern history at Oxford. The next two years he lectured on questions of political reform with much ability and originality. The outbreak of the Civil War was the turning point in his life. He warmly championed the cause of the North, and did much to convert English opinion to that side. In 1868 he gave up his career in England and settled in the United States, becoming professor of English and constitutional history at Cornell University.

In 1871 he removed to Toronto, Canada, retaining a nonresident professorship at Cornell; and from this time until his death he continued his active interest in English, Canadian and United States political and social questions, on which he wrote extensively. He served as regent of the University of Toronto, became editor of the *Canadian Monthly,* and founded the *Week* and *Bystander.* In his lectures and writings he opposed Home Rule for Ireland, was enthusiastic over the British Empire in India and prophesied the political and commercial union of Canada and the United States. He was a man of democratic ideas, keen intellect and brilliant literary style. Aside from his many periodical contributions his writings include *Lectures on Modern History, Irish History and Irish Character, The Empire, Political Destiny of Canada, History of the United States, My Memory of Gladstone, In Quest of Light* and other works.

Smith, Hoke (1855-), an American lawyer and politician, born in Newton, N. C. He was educated in a preparatory school conducted by his father, removed to Georgia in 1872 and the following year was admitted to the bar, practicing in Atlanta until 1909. Meanwhile he was proprietor of the Atlanta *Journal* from 1887 to 1898, secretary of the interior in the cabinet of President Cleveland from 1893 to 1896, and governor of Georgia from 1907 to 1909, being reelected for the term 1911-1913. However, he resigned his governorship to fill the unexpired term of United States Senator A. S. Clay, and began his senatorial duties Dec. 1, 1911.

Smith, John (1580-1631), a founder of the English colony in Virginia, born at Willoughby, Lincolnshire. Having served as a soldier of fortune in Europe, Asia and Africa, he joined the first expedition, 1606, of the London Company to America. En route, for some unknown reason, Smith was condemned to be hanged, but the sentence was not executed. He acted in the council of the colony and later he made important geographic explorations, traded with the Indians, and finally, having become the leading spirit of the colony, saved it from ruin by his energy and tact. Hurt by an accident, Smith returned to England in 1609. As he believed that his services in Virginia had not been duly appreciated, he never revisited that colony. However, in 1614, going to Massachusetts for trading purposes, he explored and made a map of the coast from the Penobscot River to Cape Cod. He named New England, but was baffled in several attempts to establish a settlement

there. In order of time, Smith was the first American writer. Barring his accounts of personal adventure, his works are trustworthy. Chief among his publications are *A True Relation of Virginia* and a *Generall Historie of Virginia.*

Smith, Joseph (1805-1844), founder of the sect of Mormons, or Church of the Latter Day Saints, born at Sharon, Vt. When he was ten years of age his parents removed to Palmyra, N. Y., and later to Manchester. At the age of 15 Smith claimed to have had a vision from heaven. As time went on the visions were repeated. He claimed that he was visited by the angel Moroni, who revealed to him the book from which later he translated the *Book of Mormon.* The Mormon Church was organized in April, 1830, with Smith as the leader. The sect grew rapidly. In February, 1831, they removed to Kirtland, Ohio, where they remained until 1838, when difficulties made their removal necessary. Smith and his followers finally settled in Hancock County, Ill., where by special grant from the governor they were permitted to establish the sort of community they desired. In 1843-44 dissensions broke out which led to the arrest of Smith, his brother Hyrum and several other leaders. While confined in jail at Carthage, he was shot and killed by a mob. See MORMONS.

Smith, Samuel Francis (1809-1895), American clergyman and author of *My Country, 'Tis of Thee,* born in Boston, Mass. He graduated at Harvard College in 1829 and at Andover Theological Seminary in 1832. From 1834 to 1842 he was pastor of the Baptist Church at Waterville, Me., and professor of modern languages in Waterville College, and from 1842 to 1854 pastor of the Baptist Chuch in Newton, Mass. From 1842 to 1848 he was editor of the *Christian Review* of Boston, and from 1854 to 1869 he edited the publications of the American Baptist Missionary Union. Besides the hymn which has made him famous, he wrote many other beautiful and devotional hymns, such as *The Morning Light is Breaking.* Among his books are *Life of Reverend Joseph Grafton, Missionary Sketches, History of Newton* (Mass.) and *Rambles in Mission Fields.* He also published a book of poems.

Smith, Sydney (1771-1845), an English humorist and divine, born at Woodford, Essex. In 1796 he was ordained priest at Oxford, and was appointed to the curacy of Nether Avon in the Salisbury plain. He lived in Edinburgh from 1798 to 1803, and together with Horner, Brougham and Jeffrey founded the *Edinburgh Review* in 1802. The following year he settled in London, contributed to the new journal, the first three numbers of which were edited by him, and became widely known as a lecturer, humorist and preacher. He was promoted slowly, but by 1831 he was appointed to the desired position of one of the canons residentiary of St. Paul's. His writings, full of humor, wit, irony and good sense, include *Letters on the Subject of the Catholics, to my Brother Abraham, who Lives in the Country, by Peter Plymley; Three Letters to Archdeacon Singleton on the Ecclesiastical Commission;* and *Letters on American Debts.*

Smith, William Farrar (1824-1903), an American general and engineer, born in Vermont. In 1845 he graduated at West Point. After teaching mathematics there and serving for several years on the corps of topographical engineers and on the board of lighthouse construction, he was made colonel of volunteers in 1861. He served throughout the Civil War, receiving several promotions for meritorious service.

Smith College, an institution for the higher education of women, founded by Miss Sophia Smith at Northampton, Mass. It was chartered in 1871 and class sessions began in 1875. All undergraduate courses of study lead to the degree of Bachelor of Arts. The degree of Master of Arts is conferred for postgraduate work. Among the college buildings are the library, containing over 60,000 books, an observatory, an art gallery and a spacious auditorium.

Smith'son, James (1765-1829), a philanthropist, founder of the Smithsonian Institution. His birthplace is not positively known, some authorities giving it as England and others as France, but he was educated at Pembroke and Oxford, distinguished himself as a chemist and in 1787 was elected fellow of the Royal Society. To the *Transactions* of the Royal Society he contributed eight papers, and at his death in Genoa, Italy, he left about 200 manuscripts, presumably portions of a philosophical dictionary. In his will he bequeathed to his nephew, H. J. Hungerford, some $515,000, stating that if the legatee died childless, the entire sum should revert to the Government of the United States. It was to be used to establish at Washington, under the name of "Smithsonian Institution," an establishment "for the increase and diffusion of knowledge." In 1835 his nephew died without heirs and some years later the money came into possession of the United States. See SMITHSONIAN INSTITUTION.

Smithso'nian Institution, an institution founded at Washington, D. C., on a bequest of James Smithson, for the increase and diffusion of knowledge among men (See SMITHSON, JAMES). The bequest, amounting to something over $500,000, came into the possession of the United States Government in 1838, but the act providing for the Institution did not pass Congress until 1846. This act was so broad as to allow for the development of the Institution along any line of progress. The Institution consists of the president of the United States, who ex officio is president, the vice-president, the chief justice of the Supreme Court and the members of the cabinet. There is also a board of regents, who transact the business of the Institution. This board comprises the vice-president, the chief justice, three members of the Senate, three members of the House of Representatives and six citizens, two of whom must be residents of the District of Columbia and the other four from states of the Union, but no two from the same state. The members from the Senate are appointed by the president of the Senate; those from the House of Representatives by the speaker; and the other four are elected by Congress, with the approval of the president. The president of the board of regents is chancellor of the Institution, and this office is usually conferred upon the chief justice. The secretary is the executive officer and he is assisted by two assistant secretaries and a large staff of scientific investigators, correspondents and other workers.

The plan and organization of the Institution are mainly due to Prof. Joseph Henry, its first secretary, who directed its affairs for over 30 years. The original fund has been increased by subsequent additions, and the income from this endowment is supplemented yearly by such appropriations by Congress as are necessary to meet the needs of the Institution. The income is used in aiding original research along various scientific lines, in publishing the *Annual Reports, Contributions to Knowledge* and *Miscellaneous Collections;* in correspondence and exchange of publications with other scientific organizations throughout the world; in maintaining the National Museum, the National Zoological Park, the Bureau of Ethnology and the Astrophysical Observatory. The Institution has collected a large library which occupies a special hall in the Library of Congress.

The Institution and the museum occupy beautiful buildings on the Mall, between the Capitol and the Washington Monument. The Zoological Park is about two miles north. See ZOOLOGICAL GARDEN.

Smoke, the vapor produced by burning any substance. Smoke from burning wood is almost colorless and consists chiefly of water and carbonic acid. That obtained in burning bituminous coal is darker, being mixed with soot. In order to have little smoke there must be perfect combustion, and this is obtained only by a proper construction of the furnaces together with intelligent firing. Various attempts have been made to consume smoke, without success, but the use of

automatic stokers and other devices for feeding coal into furnaces, when attached to furnaces correctly designed, usually reduces the smoke to a minimum. In the roundhouse of the Chicago & North Western Railway at Chicago, when several locomotives give off much smoke, an arrangement by which a very large fan sucks the smoke through a wall of water and washes out the soot and carbonaceous matter, is used to advantage, but this could not be profitably applied for general use on account of its expense. The need of some practical method for equipping furnaces that do smoke is seriously felt in all cities, especially where bituminous coal is used. The black fogs of London are produced when the moisture in the air becomes permeated with the black, oily particles of smoke, which settle down in a dark mass, often interrupting the traffic of the city. In the United States in the cities of Pittsburgh, Chicago, St. Louis and Cincinnati, where bituminous coal is burned, the smoke nuisance is regulated by city ordinance.

Smoke'less Pow'der, a highly explosive powder used as a substitute for gunpowder. As its name implies, it makes little or no smoke. It does not foul the gun so quickly as gunpowder, and it explodes with greater force when confined. There are a number of formulas and processes for making the various smokeless powders, but the usual compound employed consists of guncotton and cellulose nitrate, the latter consisting of sawdust which has been soaked in nitric and sulphuric acids. When fully hardened by drying, the product is made ready for use by separating it into grains, cords or flakes. Sometimes the process is varied by mixing with the cellulose nitrate, nitroglycerin or picric acid. The mixture depends upon how high an initial velocity or force is required with which the projectile is to be discharged, and the size and character of the gun employed. Some of the various smokeless powders are: *ballistite,* invented in 1888 by Alfred Nobel, and made in England; *cordite,* invented by Sir Frederick Abel and James Dewar and made in England; *indurite,* invented by Charles E. Munroe in 1889 and made at Newport, R. I.; *cibalite,* invented by J. K. von Falkenstein and made in Germany; *poudre pyroxyée,* made by the French Government. See GUNCOTTON; GUNPOWDER; CELLULOSE.

Smol'lett, Tobias George (1721-1771), an English novelist, born near Dumbarton, Scotland. He studied at the University of Glasgow, was apprentice to a surgeon for five years, and later shipped in the navy as surgeon's mate. In 1744 he settled in London and soon turned from medicine to literature. His first play, *The Regicide,* found no readers and Smollett was sorely disappointed, but his novel, *Roderick Random,* rich in truthful accounts of the seaman's life, whimsical figures and amusing incidents, became instantly popular. In 1750 he received the degree of M. D. from Marischal College, Aberdeen. The next year appeared *The Adventures of Peregrine Pickle,* rivaling his earlier success in eccentricity and brilliant satire. The amusing *Expedition of Humphrey Clinker,* his masterpiece of drollery and keen humor, written in letter form, appeared in 1771. Despite the brutality and coarseness of his work, much of which is accounted for by the toleration of the century, Smollett's writings are a tribute to his extraordinary powers of observation, description and caustic wit.

Smug'gling, a violation of revenue laws by importing or exporting prohibited merchandise or by the evasion of required payment of customs duties. The practice became common in Europe as soon as tariff duties were enacted, and English legislation on the subject was necessary in the 14th century. To prevent smuggling, the United States employs customs officers and inspectors at every port where foreign goods are received. It is the duty of these officers to examine personal and private baggage, as well as shipments of merchandise, and to see that the regular duties are paid. The offense of smuggling is punishable by forfeiture of the goods, by requiring

the payment of three times the value of the goods and by fine and imprisonment. The fine cannot exceed $5000, and the term of imprisonment cannot exceed two years. All indictments for smuggling must be tried in the United States courts. See TARIFF.

Smut, a fungus disease attacking cereals. There are two chief classes, known in the United States as the stinking smuts and the loose smuts. The former, in England known as bunts, attack only wheat and destroy nothing but the kernel; they may be readily recognized by their disagreeable odor. The loose smuts, also known as dust brands because of their powdery spores, destroy the whole spikelet.

SMUT

STINKING SMUTS. These grow upon the wheat seedlings, but do not appear until the wheat is in bloom, unless sometimes they give the leaves and stalks a lighter color. When the wheat blossoms, the presence of the smut is made known by the stiff, erect head, the spreading florets and the tiny scales. The fungus grows in the ovary of the flower and thus every kernel of an infected plant is diseased. As the grain matures, the fungus also matures, and a kernel, if crushed, discloses a dark, olive-green mass having a strong, disagreeable odor like that of rotten fish. Seeds thought to be infected should be treated by the hot-water method given under FUNGICIDE. Another method is sprinkling the grain with one pound of corrosive sublimate to 50 gallons of water. The grain should be raked or shoveled over with wooden instruments until all has been moistened, but metal must not touch the solution, which is poisonous. Seeds are also said to be rendered free from smut if soaked in one pound of formalin to 50 or 60 gallons of water for two hours before planting.

LOOSE SMUTS. These attack barley, maize, oats, wheat, rye and onions. That of oats is said to cost the United States at least $18,000,000 annually. Like the stinking smuts, this fungus appears only after the plant is in flower, and its dark spores are the part generally known as smut. These are soft and powdery and are scattered by the wind and rain. Before planting, seed thought to be infected should be steeped in a wooden vessel in a solution of potassium sulphide, one and one-half pounds to 25 gallons of water, for 24 hours, or sprinkled with a one per cent solution of lysol or formalin. The hot-water method of treatment suggested under FUNGICIDE may be also used here. Rye smut streaks the leaves and culms with black and deforms the tissues of the entire plant. Seeds can be protected from the disease by immersing them for five minutes in water at 127° F.

Maize smut is known wherever corn is raised. It rarely appears before the corn is three feet high and attacks both leaf and ear, causing upon the ear large swellings from the size of a walnut to that of a child's head. The swellings darken and burst, disclosing millions of olive-green spores. The smut occurs most commonly where fresh manure has been used as fertilizer. Barley smut, loose smut of wheat, sorghum smut and onion smut show various forms and are treated in similar ways. Consult Massee, *A Text-Book of Plant Diseases,* and bulletins of the United States Department of Agriculture.

Smyrna, *Smur' na,* a seaport of Asiatic Greece, situated on the Gulf of Smyrna, 200 m. s.w. of Constantinople. It is the most important town of Asia Minor, and about half its population is Greek. In ancient times it was a city of power and splendor, and now its

trade, especially with Great Britain, is very extensive, the exports consisting chiefly of silk, figs, raisins, tobacco, carpets and a dyestuff known as valonia. Good railroad connections with Constantinople and other towns in Asia Minor are maintained. The founding of Smyrna dates back to the dawn of history. Population, estimated at 350,000.

Snail, a name now applied loosely to a number of families of land and water Mollusca. The true snails, which constitute a family by themselves, are found in warm, moist situations and generally where there is a goodly supply of leaf mold. They are usually to be seen under old logs and in moss-covered stumps but in bright weather they seem to enjoy lying in the sun. They may be recognized by the familiar, spirally-coiled shell, which is attached to the body by means of a thin, white, muscular membrane, and which is of sufficient size to allow the entire body to be drawn within it. If the snail be placed upon a clear glass plate and watched from beneath, one can readily see how it walks, if its method of locomotion can be so-called. First there extends from the shell a long, flat-bottomed organ called the foot, by whose wavelike action motion takes place. The entire foot is covered by a rough skin, from which oozes a slimy secretion of mucus that aids the snail both in clinging to smooth surfaces and in keeping its body moist. With no better means of locomotion than this and the prospect before it of crawling along a dry, hot fence rail, it is no wonder that the snail is deliberate in its movements and has become the type of slowness. The mucus must be secreted continually in order to make motion possible at all, and thus a slippery, slimy trail marks the course over which the snail has lately traveled.

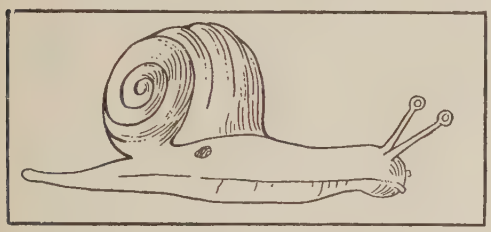
Upon the surface of the foot are two openings: the one which lies near the shell is the breathing pore and leads to the lungs; the other is the opening from an alimentary tract. Near the edge of the shell may be seen a thin fold of tissue called the mantle, which secretes the shell. Just how this is done is uncertain, but it is either by the oozing of a slimy substance which hardens into shell or by the depositing of the lime within the mantle, after which the mantle separates, leaving the shell exposed. Within the shell lie the stomach, the other organs of nutrition, the heart and the lungs, all of which may be seen through the thin enveloping membrane when the shell is removed. The head is attached to the forward end of the foot and is recognized by the two pairs of "horns," or tentacles. The upper and longer pair have at their extremities tiny black specks which are the eyes, well located indeed for gazing in all directions. If the snail is startled the tentacles are withdrawn by a curious process of turning them "outside in."

The head is also furnished with strong jaws which surround a peculiar, ribbon-like tongue that is beset with thousands of tiny, hard teeth. The tip of the tongue is used in rasping food, and as fast as the teeth in front are worn off, the ribbon is extended and the new-growing teeth farther back are brought into play. By means of these strong jaws and sharp teeth the snail is known to be a carnivorous, or flesh-eating, animal, but it is also fond of tender leaves and juicy vegetable tissue. In the snaileries of France, where snails are raised for the market, they are fattened upon a diet of lettuce, cabbage and corn meal. In winter or in dry weather the snail goes into winter quarters by crawling underneath decaying leaves, gluing several of these to its foot by means of its own slimy mucilage and then withdrawing into the shell until the leaves form a tightly locked door. The eggs are laid in the spring and are round, elastic balls about the size of shot. The usual life of the snail is from two to five years.

Classification. North American snails are divided into six genera, according to the shape and structure of the shells. Some of the snails of still other classes are: the armadillo snail, whose shell consists of eight sections in which the snail can roll itself when disturbed in the same

manner as does the armadillo; the burrowing snail, which lacks eyes; the glassy snail, whose shell is thin and almost transparent; the amber snail, which is sluglike in habit; the ear snail, with rounding shell whose inner sections are often absorbed to be used in strengthening the remaining parts; and the universally distributed pond snails, which have small, fragile shells and are found in the winter buried in the mud at the bottom of ponds.

Uses. In the Mediterranean countries snails are especially desired as a food,



SNAIL

for there they are considered a delicacy that has the unusual quality of being healthful. In the United States they are not at present popular, although an attempt is being made to cultivate a taste for them. A less commendable use to which they are sometimes put in European countries is the furnishing of a creamy mucus, which, when introduced into skim milk, produces an almost undetectable imitation of cream.

Snake. See SERPENT.

Snake River, a river of the United States and the largest tributary of the Columbia. It rises in the southern part of Yellowstone National Park, flows southward, then westward, then northward and again westward and enters the Columbia in the southern part of Washington. It forms a part of the boundary between Idaho and Oregon and Idaho and Washington. Its length is between 900 and 1000 m. It flows through a mountainous country, and numerous falls and rapids occur in its course. Of these, Shoshone Falls are the most noted. Its chief tributaries are the North Fork, Salmon, Boise, Clearwater and Palouse from the north, and the Owyhee and Grande Ronde from the south.

Snap'drag"on, an odd-flowered plant of the Figwort Family. It grows in fields and old gardens in eastern United States, but is a native of Europe. It has erect, leafy stems; smooth, narrow, green leaves; and each flower stem bears a cluster of irregular purple or white flowers in June and July. The flower is made up of a long tube, which is terminated by two tightly closed lips that effectually bar out ant visitors but open to the magic touch of the bee. One less common species is a native of Mexico and Texas and has more open lips, broader leaves and a climbing stem. Toadflax, an allied genus, jewelweed and wild columbine are sometimes mistakenly called snapdragon. See CROSS-FERTILIZATION.

Snipe, Wilson Snipe or **Jack Snipe,** a bird of the Snipe and Plover Family. The Wilson snipe is larger than the robin. The bill is long and grooved, with a roughened and widened tip with which the snipe digs about in the mud for Mollusks and Crustaceans. The plumage is mainly buff and white with black lines and stripes which are especially marked on the head and back. The sides are barred with black and white and the abdomen is white. The nest is made on the ground in the marsh and is lined with grass. It contains three to four eggs streaked with brown and black. This familiar game bird is distributed over the greater part of North America in marshy localities. When hunted, it lies well concealed until the hunter is close upon it, when it flies swiftly away with an irregular flight, offering a difficult shot to the sportsman.

Snorri Sturluson, *Snor' re Stoor' loo sun,* (1179-1241), an Icelandic statesman and historian, known chiefly for his *Heimskringla,* or annals of the early kings of Norway, and the *Prose Edda,* also known as *Younger Edda.* Following a visit to Norway in 1218, at the invitation of King Haakon, he brought about rather unsatisfactory terms of peace between Norway and Iceland. He

gained the material for his Sagas from tradition, legends and chronicles, and added to the value of his compilations by his preface in which he expounded various literary principles with marked critical acumen and skill.

Snow, ice crystals formed in the upper atmosphere by water vapor which has condensed at freezing temperature. These crystals are very minute and of various shapes, but when several unite a snowflake is formed. When condensation takes place slowly in still air, the particles crystallize in six-sided figures; but under different conditions they are very irregular in shape. The whiteness of snow is due to the multiple reflection and refraction of light rays amongst the myriads of tiny crystals. In the snowflake, layers of air alternate with layers of ice, and, because of this, snow is a poor conductor of heat. A covering of snow upon the ground, therefore, serves as a blanket holding in the heat by preventing radiation. Snow is deposited over a large portion of the earth's surface, its distribution depending upon latitude and altitude. It covers the ground the greater part of the year in the regions of the poles, but is rarely seen at the sea level at latitude 30°. The snow line, or line of perpetual snow, marks the boundary of the region in which more snow falls in the course of a year than can be melted by the sun in the same time. This boundary depends upon the various influences which, in general, affect climate. Its mean annual temperature varies from 37° to 3° F. Areas which are covered throughout the year with snow form what is known as a snowfield. In the United States snowfields cover parts of Colorado and Utah. See RAIN.

Snow'berry, a name locally applied to almost all white-berried plants but accurately given to only three. The most common of these in the United States is the snowberry of the Honeysuckle Family, a small, twining shrub, well known in cultivation. Its branches rarely grow more than three feet in length and are much-branched. The leaves are oval and undivided and opposite each other on the stems. The flowers grow in loose, rose-colored clusters which appear in July and August. They have small four-toothed calyxes and bell-shaped corollas, which are edged with four to five unequal lobes and lined with rough hairs in the throat. The berries are very abundant and hang in heavy white clusters, making a decidedly pleasing part of the autumn and early winter landscape. These berries are round and pulpy but not edible.

A less common snowberry is a trailing, evergreen herb of the Heath Family found in Northern bogs. It is a hairy plant with small, round leaves, tiny flowers borne in the axils, and dry, white berries. This species is generally called creeping snowberry.

The third species is the tropical snowberry of Florida and the West Indies, which belongs to the Madderwort Family. It also is an evergreen shrub and has climbing stems, which bear clusters of yellow blossoms followed by pulpy, white berries. This plant is cultivated for its medicinal properties.

Snow'bird". See JUNCO.

Snow'drop", an early spring flower of the Amaryllis Family, sometimes called fair-maids-of-February. Its two long, pale green leaves rise from a bulb, as does also the flower stem, which bears a drooping, greenish-white flower, often very double. The snowdrop grows in the dry parts of the temperate zone and is also found in cultivation.

Snow'flake", a bird of the Finch Family. The snowflake is a trifle larger than the English sparrow and, in summer, is white with black markings on the back and wings. In winter the plumage of the back, head and chest is marked with rusty brown, or chestnut. The nest is placed on the ground and is made of grass, lined with feathers and fine grass. Five whitish eggs are laid, which are speckled with brown and black. The snowflake rears its young in the bleak Arctic regions of America and Siberia, migrating south to the northern part of the United States, where it is

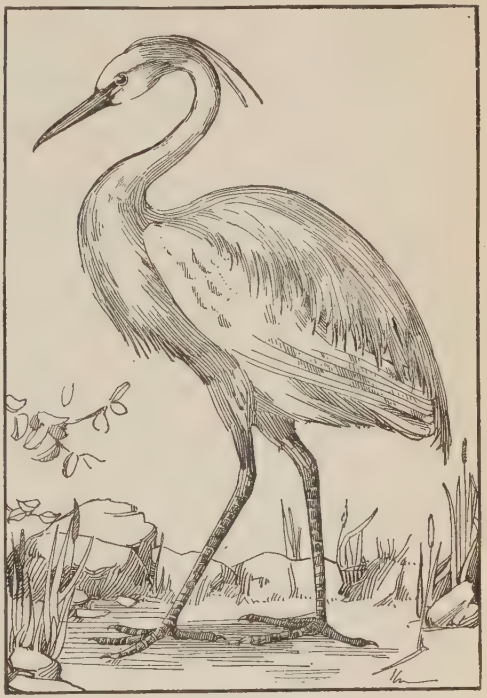
one of the most familiar of winter birds, appearing in large flocks in localities where weeds or other wild plants are plentiful.

Snow'plow", a plow for cleaning snow from roads, sidewalks and railways. Snowplows for roads and sidewalks are usually triangular and are drawn by a horse. Those used on railways vary in form and size. The older patterns are triangular, with a sharp edge on the median line. They are pushed in front of the locomotive and throw the snow outward and upward. In sections where heavy snows are common the rotary plow is used. This consists of a large wheel with buckets, a hopper, a powerful blowing machine and a delivery pipe. The entire apparatus is operated by a special engine. As the plow is pushed forward, the wheel revolves and scoops up the snow and drops it into the hopper, from which it is driven out through the delivery pipe by the fan.

Snow'shoe", a kind of shoe for walking on snow. Snowshoes are made of wood or of wood and rawhide, the latter being lighter and more generally used. They consist of a light frame, which is filled with a coarsely woven mat of rawhide. The shoe is attached to the foot with thongs, which are so arranged that the heel is raised from the shoe in walking. Snowshoes are from three to four feet long and from a foot to a foot and a half wide in the middle, and taper towards each end. They are now seldom used, except for pleasure.

Snowy Heron, a bird of the Heron Family, characterized by its white plumage. It is found in large numbers in Florida and Jamaica and occasionally as far north as Indiana and Illinois. This bird is prized for its plumage and is in danger of being exterminated by hunters. The birds are shy and found only in out-of-the-way places. Their habits are similar to those of the common heron. See HERON.

Snuff, the powdered stems and leaves of the tobacco plant, which have been fermented by heat and moisture, then dried and scented for inhaling. Formerly it was considered as much a matter of etiquette to offer "a pinch of snuff" from the snuffbox as to pass the greetings of the day. The custom of snuff taking is becoming very uncommon in this country but is still practiced in southern Europe. However, snuff is manufactured in large



SNOWY HERON

quantities in the United States, where at present the process is carried on by machinery.

Soap, *Sope,* a cleansing compound made by adding fats or oils to an alkali, usually potash or soda. Soap was known to the Romans, who probably obtained their knowledge of it from the Gauls. It is now a standard commercial product of the civilized world. Lard and tallow are the fats most generally used in the manufacture of soap, and olive oil, palm oil and coconut oil are the oils most frequently employed. Sometimes glycerin is added to make the soap transparent or to increase the lather produced.

The soap used by our forefathers was homemade and generally known as soft soap. The alkali was obtained by leaching wood ashes, and the grease was largely waste grease that accumulated from month to month. The usual method was to place the grease and lye in a large kettle and boil the mixture until the grease was dissolved. The product was a soft soap having the consistency of jelly. Soap is now manufactured on a large scale in factories, some of the largest of which are connected with the packing houses, and which make use of their by-products.

Many varieties of soap are made, and the details of manufacture depend upon the ingredients used and the variety of soap desired. The ingredients are mixed in large vats holding several tons each, and for the better grades of soap they are thoroughly cleansed and purified. Pure material makes a white soap. The colors of toilet soaps are produced by adding coloring matter, and the perfumes by the addition of volatile oils. Transparent soaps contain glycerin or are made transparent by being dissolved in alcohol, then having the excess of alcohol drawn off and the solid matter pressed into molds. The yellow color of laundry soap is caused by the addition of rosin. Scouring soaps contain fine sand, powdered pumice stone or some other scouring material. Liquid soaps are used in public wash rooms, for shaving and for toilet purposes. Powdered soap is also used in a similar manner. The manufacture of soap is an important industry and in the United States the yearly output amounts to over $50,000,000.

Soapstone, *Sope' stone",* or **Ste'atite,** a soft rock which feels soapy to the touch. The color ranges from light gray nearly to black. Powdered soapstone is useful in preventing friction between parts of machinery; and a soft, white variety is used by tailors for marking. Soapstone can be made into statuary, hardened by baking, and colored in imitation of more valuable stone. Small blocks of the stone are sometimes used as foot warmers and are called freestones. Soapstone is a variety of talc.

Sobieski, *So byes' ke,* **John.** See JOHN III.

Social, *So' shal,* **Democrats.** See POLITICAL PARTIES IN THE UNITED STATES, subhead *Socialist Party.*

Socialism, *So' shal iz'm,* (from *social,* Latin *socialis,* relating to companionship or association), broadly speaking, a proposed economic system in which industry is to be carried on under social direction and for the benefit of society, as contrasted with a competitive industrial system for private gain. More specifically, as the term is now coming to be used, socialism is a proposed cooperative organization of society wherein the wealth produced shall be the property of the individual workers, while the means of production and distribution are the common property of the community, or are owned by the government. Socialism should not be confused with communism. Both have in view the economic benefit of the individual; but while communism seeks this by the proposed abolishment of all private property, socialism advocates the retention of private property in income or earnings and the abolishment of the private capitalist. Neither should socialism be confused with anarchism, of which it is indeed the extreme opposite. The anarchist desires less State regulation than we now have; the socialist desires more. Anarchism denies all rights of governmental authority; socialism, on the other hand, proposes a great extension of the functions of the State, so as to include the establishment of an industrial democracy under State control.

The early socialistic theories were of an idealistic nature, presented in such works as Plato's *Republic* and Sir Thomas More's *Utopia,* which were dreams of a social commonwealth that should be a cooperative brotherhood. During the latter part of the 18th and the first half of the 19th century Utopian socialism found able advocates. Among them were Fourier, Saint-Simon and Cabet in Europe, and Greeley, Dana and Nathan-

iel Hawthorne in America. Robert Owen marked something of an advance on this position. While he pictured Utopias and founded colonies, he also advocated ideas which became a direct contribution to modern socialism. Closely akin to this idealistic type of socialism is what is known as Christian socialism, which advocates the application of the principles of Christ, which are the principles of common brotherhood, in the industrial life of the world, without advocating any specific program for the gaining of this end. An influential company of Christian socialists in England in the middle of the 19th century included men like Thomas Hughes, Charles Kingsley and F. D. Maurice.

Modern scientific socialism may be said to have begun with Karl Marx and Friedrich Engels. In 1845 Marx was ordered out of Paris and was joined in Brussels by Engels, where they founded the *German Workingmen's Association.* Here they became members of the Communist League, and wrote the *Communist Manifesto,* which has had far-reaching consequences. It summarizes the philosophy of socialism, and has become the basis of many socialist platforms. It has been translated into nearly every known language.

Socialism has assumed various attitudes toward the State, represented in part by different stages of growth, and in part by different schools of thought. In the first stage, idealistic socialism preferred voluntary cooperation to State assistance. Perhaps Louis Blanc, in the middle of the 19th century, more than any other, founded political socialism. He held that socialists should gain control of the State and use it for the establishment of their principles. Ferdinand Lassalle in Germany took a similar position. A third attitude is found in Marx and his followers, who look askance upon existing governments and social institutions as being controlled by capitalistic influence. They have therefore no special enthusiasm for State ownership until states shall have become industrial democracies. A fourth attitude is represented by the conservative wing of socialism, whose adherents are ready to cooperate with existing governments in reforms that are in general harmony with the socialist program. The Fabian socialists of France and many socialists in the United States are good representatives of this type.

All schools of socialism, however, contemplate the ultimate transformation of governments into industrial democracies which shall control production and regulate industrial conditions. Most socialists are now inclined to take a cooperative rather than a revolutionary attitude toward the government, in the hope of thus gradually securing their reforms. With this in view, in most prominent nations the socialists are now organized in political parties. There are strong socialistic parties in France, Italy, Holland, the Scandinavian countries and in the United States. They welcome such approaches to their program as government ownership of railroads, telegraph lines and other public utilities. Socialists also look with satisfaction upon the elimination of competition by great combinations of industry, believing that the next step will be the assumption by the State of the functions of these industrial corporations. They believe that the only cure for the evils of competition is monopoly, and that the only protection against private monopoly is State monopoly.

In conclusion it may be noted that, entirely outside of organized socialism, there has been a rapid growth in recent years of certain tendencies of a socialistic nature, such as municipal ownership of various city industries, the advocacy of Federal supervision of corporations by such agencies as the Interstate Commerce Commission in the United States, government regulation of prices and conditions of service, the Federal leasing of land and mines, and other State activities of a similar nature. See ANARCHISM; COMMUNISM.

Socialist, *So' shal ist,* **Party.** See POLITICAL PARTIES IN THE UNITED STATES, subhead *Socialist Party.*

SOCIAL SETTLEMENTS

Social Settlements, associations of educated men and women who live among the poor and improvident of the large cities and exert their influence for the betterment of the social conditions of these lower classes of society. In England the question of social obligation was agitated in the middle of the 19th century by men like Thomas Arnold, John Ruskin, Charles Kingsley, Thomas Carlyle and Charles Dickens. Young men in the leading universities were appealed to in behalf of the miserable, degraded population that existed in London in such large numbers. Arnold Toynbee, of Oxford, lectured before the students as well as before the working men's organizations in London, and by his generous, brotherly spirit and ideals became the founder of the settlement work, although he established no institution.

Inspired by Toynbee's personality and example, Canon Samuel A. Barnett built a hall in the east end of London, to the memory of Arnold Toynbee, who died in 1883. Toynbee Hall, the first settlement, was made a nonpartisan, undenominational institution, and its social and educational activities were controlled entirely by university men. Twenty-three men are usually in residence; several of them are business men; all devote a part of their time to bringing culture and pleasure into the lives of the poor. From this beginning other settlements sprang up until there are now about 40 such institutions in England. Mansfield House in London is second only to Toynbee Hall in interest and importance. One of its main features is the emphasis given to religious instruction.

Stanton Coit, who was familiar with the activities of Toynbee Hall, started the movement in the United States with his founding of the Neighborhood Guild of New York, later known as The University Settlement. Almost simultaneous with this was the establishment of College Settlement, also in New York. The residents of The University Settlement are 12 in number. About 10,000 persons come in contact with its activities every week. Social, rather than educational, work is of prime importance, and one of the prominent features of the institution is the club work touching the lives of the great mass of the laboring class. Another settlement movement in New York, which is personal rather than institutional in its influence, is the Nurses' Settlements, originated by Miss Lillian D. Wald. Its organization consists merely of a number of houses scattered throughout the city, where the nurses live. From these as centers, radiates the influence which springs from the nursing activities of the residents, as well as from their interest in general social reform.

Hull House, in Chicago, was founded in 1889, by Miss Jane Addams and Miss Ellen Starr. They chose as a location for the settlement one of the centers where the foreign population prevails. The buildings of Hull House are arranged to form a consolidated group. They are, the main house for residents, a gymnasium building, a theater, a restaurant, the women's club rooms, and the boys' club building. In the immediate neighborhood are the cooperative clubhouse for working girls, the Mary Crane Nursery, and the building occupied by the Juvenile Court and the Juvenile Protective Association. From October through eight consecutive months of the year the activities of Hull House consist of instruction in industrial work; such as spinning and weaving, cooking, woodworking, metal working, pottery making, bookbinding and printing. Classes are organized offering instruction in English, French, German, geography and literature. Dancing, gymnasium work and athletic sports are popular forms of recreation. It is estimated that about 9000 persons come under the direct influence of Hull House every week. The Chicago Commons was established with an aim similar to that of Hull House. Prominent among the men who have taken active interest in the question of social betterment of the masses, but not immediately connected with settlement work as such, is Jacob Riis, a distinguished resident of New York City.

European settlements similar to these are the Universite Populaire and the Œuvre de Popincourt of Paris, the Ouis Huis of Amsterdam, the Toynbee Guild at Sydney, New South Wales, the House of Neighborly Love and Kingsley Hall, both in Japan. There are over 100 settlements in the United States, about half that number in England, several in Paris and Holland, one in Berlin, and the movement has extended even to India. See ADDAMS, JANE; BOOTH, WILLIAM; RIIS, JACOB AUGUSTUS; TAYLOR, GRAHAM. Consult Bliss, *Encyclopedia of Social Reform;* S. Coit, *Neighborhood Guilds;* G. Montgomery, *Bibliography of College, Social, University, and Church Settlements.*

Society for Prevention of Cruelty to Animals. See BERGH, HENRY.

Society Islands, or **Tahiti Archipelago,** *Tah' he te Ahr" ki pel' a go,* a group of islands in the South Pacific, between Low Islands and Friendly Islands, a possession of France. There are the two groups, the Leeward and the Windward. To the former belong Huahine, Tahaa, Raiatea and Bora-Bora; to the latter, Tahiti and Moorea. They are of volcanic origin, and coral reefs form numerous coast lagoons. The climate is hot and moist, but not unhealthful or unfavorable to the growth of a luxuriant flora. The products are principally vanilla, coconuts, bananas and sugar. The islands were discovered by Pedro Fernandez Quiros in 1607. Population, chiefly Malays, about 18,000.

Sociology, *So" shi ol' o jy,* (from Latin *socius,* companion, hence *societas,* society, + Greek *logia,* account), the science of society or human association. The term was coined by Auguste Comte in 1839 to designate the highest member in his classification of the sciences. It was given wide currency by Herbert Spencer, and has now come into common use. While the term has been made to include many phases of meaning by different writers, ranging all the way from vague social generalities to complete social philosophies, no better general definition has been suggested than the one given above. Defining sociology, then, as the science of society, the materials to be studied are derived from three sources: (1) the life and institutions of primitive peoples, as revealed by the study of ethnology and anthropology; (2) the history of society from early times to the present, as critically reconstructed by modern historians; (3) contemporary social conditions.

In studying the phenomena of society, sociology employs the inductive method and is characterized by the scientific spirit. In times past social problems have often been left to the benevolent impulses of religion, and have been dealt with without adequate knowledge of the data and elements involved; or else have been studied in isolation as some reformer attempted to improve conditions here and there. The elevation of sociology to the position of a science means that the method and spirit of observation and classification which have proved so fruitful in the physical sciences in building up a body of exact knowledge, will now be applied to the investigation of the more complex and difficult field of associative phenomena in human relations. This reliable knowledge will then be available for the use of social workers in all lines of reform, just as the conclusions of natural sciences have been applied in modern investigation and commerce. Herein sociology reveals its practical justification and point of attachment.

Sociology may be divided into general and special sociology. *General sociology* deals with the general or fundamental phenomena of society. It seeks to discover the universal elements in all types of associative life and to formulate the general causes and laws of social evolution. In this respect it might be termed the philosophy of society. Some writers, indeed, would confine sociology to this field. But others, and apparently with good reason, make it include also *special sociology,* which consists of the entire group of special social sciences, such as ethnology, anthropology, history, political economy, political science and juris-

prudence. In this aspect sociology is a synthesis of all the particular social sciences. The two aspects of sociology supplement each other, and the one shades necessarily into the other.

Sociology regards human society as organic in character; all of its parts are mutually related and mutually dependent upon each other. It regards society as a product of physical and mental forces, developing in an evolutionary process in which the earlier simple and instinctive activities gradually become more complex, reflective and purposeful. Neither the individual man nor the special institution can be studied or understood by itself, but only in relation to its fellows in the present and in the past. Sociology has greatly influenced the viewpoint of modern life, has reconstructed such special sciences as psychology and ethics, and is gradually leavening the entire industrial and political fabric of society. Consult Fairbanks, *Introduction to Sociology;* Small and Vincent, *An Introduction to the Study of Society;* Henderson, *Social Elements;* Giddings, *The Theory of Sociology;* Small, *General Sociology.*

Socrates, *Sok' ra teez,* (469-399 B. C.), a famous Greek philosopher of the Age of Pericles, born at Athens, of humble but genuine Athenian stock. He received the customary education of a Grecian youth in gymnastics and music. Later he added geometry, astronomy, the methods and doctrines of Greek thinkers and knowledge of contemporary Athenian culture. At first he followed the profession of his father, a sculptor, and tradition attributes to him a group of the three Graces standing on the road to the Acropolis. But he soon abandoned art and gave himself to learning and teaching.

He was also identified with public affairs, serving with conspicuous bravery as a soldier at Potidæa (432-429 B. C.), at Delium (424 B. C.), and at Amphipolis (422 B. C.). In 406 B. C. he was a member of the Athenian Senate, where as presiding officer he refused to put an illegal motion for the condemnation of the eight generals who had failed to rescue the wounded and bury the bodies of those slain in the Battle of Arginusæ. Not less courageous was his refusal a few years later to obey the command of the "Thirty" to assist in the arrest of an innocent citizen.

The great services of Socrates, however, were in connection with his philosophy and teaching. His method was peculiar. He lived constantly in public, frequenting the gymnasium, the market place and wherever men congregated. Drawing a man into conversation by means of some simple question, he would lead him on to admission after admission, until he had hopelessly tangled him up in contradictions, if he wished to confute some self-conceit or folly; or, in case he wished to establish some moral truth, he would lead the admissions from one statement to another until his truth seemed to be self-evident. This way of teaching by conversational questioning is still known as the Socratic method.

The philosophy of Socrates is not so well known as his method. He left no writings, and did not work his teachings out in systematic form. Our sources of information are two of the men belonging to the inner circle of those who gathered about him as friends and disciples. Xenophon in his *Memorabilia* gives a simple and matter-of-fact account of his master. Plato, in his *Dialogues,* gives his master's philosophy transformed and colored by his own. It is clear, however, that Socrates was chiefly concerned with moral questions rather than with speculative philosophy. The center of his system was that knowledge determines virtue. If a man knows the truth and the right he will love them and live them. He believed in the immortality of the soul, in the unity and permanency of truth, and in a supreme intelligence, a moral and righteous God, above the many Greek deities. Socrates marks the beginning of the second period of Greek philosophy. On one side of his philosophy, he turned from the study of nature which had occupied philosophers in the past, to the study of man himself.

"Know thyself" was his motto. On the other side, in opposition to the contemporary Sophists, he transformed their subjective individualistic egoism into universal reason with objective validity. With him the philosophy of objective thought begins.

His personal peculiarities, his ridicule of the vain and boastful, his new doctrines and his intellectual independence made him many enemies; and he was brought to trial on the charge of rejecting the gods of the city, introducing new divinities and corrupting the youth. Condemned to death, he spent the last day of his life discussing with his friends the immortality of the soul, and calmly drank at evening the fatal cup of hemlock.

In person Socrates was not prepossessing. He was short, portly and ungainly, with a flat nose, thick lips, staring eyes and bald head. He wore a single coarse garment summer and winter, and went barefooted. He claimed to be guided by a "spirit" or inner voice whose admonitions he must heed. Simple and homely in speech, professing ignorance where others boasted wisdom, he so impressed himself upon his disciples that he stands out as one of the great personalities of history; while his teachings, especially through the writings of his great disciple Plato, have exercised an immeasurable influence upon the world's thinking. See PHILOSOPHY; SOPHISTS; PLATO; ARISTOTLE.

So'da, a name given to several compounds of sodium. The carbonate is generally called sal soda, washing soda or soda crystals, and is manufactured in large quantities by three different processes. These are known as the Leblanc process; the Solvay, or ammonia, process; and the electrolytic process. The industry is generally known as alkali manufacture; the Leblanc process consists in the production of the carbonate by treating salt with sulphuric acid, calcium carbonate and coal. The entire process is very complex and involves the production of many important by-products. Sal soda is used as a disinfectant and in the manufacture of soap and glass.

Sodium bicarbonate is generally known as baking soda, cooking soda or saleratus. It is used, as its common name implies, in cooking and also in medicine. Sodium hydroxide, or caustic soda, is similar to caustic potash, and is prepared by the action of lime upon a dilute solution of boiling sodium carbonate. It is used in the manufacture of glass and soap. Sodium oxide, used in medicine, is frequently called soda alum or soda salts.

Soda Water, an effervescent beverage consisting of drinking water charged with carbonic acid gas under pressure. It contains no soda as now dispensed, and derives its name from the fact that formerly it was made by subjecting bicarbonate of soda in water to sulphuric acid. The carbonic acid is now made by using carbonate of lime or finely ground marble dust and sulphuric acid, and the gas is put up under pressure in long tubes, which the dispenser connects with the pipes supplying his soda-water fountain. Soda water is sparkling and pungent in taste, and is usually served with sirups made from fruits or with ice cream and other substances. Ginger ale, pop and a variety of beverages consist of water flavored with different extracts and charged with carbonic acid gas and bottled under pressure. Upon the removal of the cork the gas escapes, causing an effervescence.

So'dium, an element well known through its widely distributed compound, sodium chloride, or common salt, which is found in sea water, in many soils, in salt beds and as rock salt. The metal sodium, which was secured by Davy in 1807, is a soft, white metal, which oxidizes readily in moist air. If a piece of metallic sodium is thrown upon water, the water is decomposed and the sodium whirls about with a rapid rotary motion. If this motion is stopped, heat is produced which ignites the sodium, causing it to burn with a bright yellow flame.

The manufacture of sodium carbonate is one of the great industries of the

world. Bicarbonate of soda is used in the manufacture of baking powder; sodium nitrate, or Chile saltpeter, is used in the manufacture of nitric acid and of potassium nitrate. Its phosphates are used in medicines, and other salts, for example, sodium borate, commercially known as borax, are used in the manufacture of glass and soap. See SALT; BAKING POWDER; SODA.

Sod'om, the chief of five cities which stood near each other in the vicinity of the Salt Sea (Dead Sea). Sodom is first mentioned in *Genesis,* as marking one of the boundaries of the Canaanite settlements, and later it appears in connection with Lot when he separated from Abraham. Sodom was especially characterized by the extreme wickedness of its inhabitants, because of which, this city, with three neighboring ones, was destroyed by Jehovah. In *Genesis xix* it is recorded that Lot and family were permitted to escape at this time, but his wife was turned into a pillar of salt for not obeying the divine command to refrain from looking back. Sodom is usually associated with Gomorrah, one of the cities destroyed.

Sofia, *Sau' fe ya,* the capital of Bulgaria, situated on the Boyana River near the Western Balkan Mountains. Among the principal buildings are the round Chapel of St. George, several mosques and cathedrals, the theater, the palace of the prince, the Parliament House, the university and the national library. The Turkish form of architecture has yielded almost entirely to the European style. The industries include the manufacture of silk, tobacco, sugar and pottery. Because of its position—Sofia commands the routes to Constantinople, Macedonia, Belgrade and the Danube—it was chosen as capital of the state in 1878. Population in 1910, 102,769.

Soil, the loose surface of the earth's crust in which plants may be made to grow. It has been formed by means of numerous agencies which have aided in breaking up and grinding the first-formed rocks, in mixing them with organic matter and in transporting the product thus made to all parts of the earth. The soil varies in depth from one inch to several feet; the uppermost portion, which is mixed with much organic matter, is the darkest and the most fertile; beneath this is the subsoil.

HOW SOIL IS MADE. The agencies that have transformed the rock into soil are the wind, water, sunlight, plants and animals. The oxygen, which constitutes about 21 per cent of the air, unites readily with almost all elements, especially in the presence of moisture, an action easily observed in the rusting of iron. Thus the action of the air alone would tend, though very slowly, to tear down the hardest of rocks if made up of substances with which the oxygen would combine. The force of the wind would tend to remove other particles which, blown against the surface, would grind off still more. Since the wind is caused by changes of temperature, this may be said to be an effect due to sunlight. The sunlight also warms the earth and thus hastens decomposition of the rocks. The most powerful agent of all is water, which acts in many ways. By a continual process of freezing and thawing, the hardest rocks are broken, since water, freezing, expands and by the force of its expansion breaks off huge pieces which are again and again broken until they are of such small size that they are a part of the soil. This process carried on by both air and water is called weathering and is being continually performed. Further, the action of waves on the shore of rivers and of smaller streams by their constant force wears away the surfaces of cliffs. The broken pieces are turned, rolled and ground off in transportation, and the fine particles so formed are deposited at the mouth of the stream or at the bends in the shore, forming there a soft, rich soil known as alluvium. Much of the substance contained in the rocks is dissolved by the water, whose action is, therefore, chemical as well as physical.

Plants are equally efficacious, although less noisy in their labors. The tiny lichen clinging tightly upon the surface

of a seemingly unyielding rock has found some roughness in which it can get foothold. Within its leaflike body is a busy laboratory which manufactures an acid that slowly but surely eats its way into the stone and softens the surface. This action may be easily seen by pulling the lichen away from the rock and noticing the stain of the growth and the depression or roughness there formed. These plants also form a resting place for seeds, which will take root and add their strength to that of the lichen. Slowly the rock gives way to this continual and increasing pressure until at last it splits and offers still greater surface to the action of new plants, the air and the water. The plants in dying add to the soil much of the organic matter that renders it rich and fertile. This is especially seen in the peat swamps and old forests or in the mangrove swamps of the South, where the high-arched roots entangle leaves, boughs and floating seaweed and add them to the soil. The decaying organic matter is called humus. It adds plant food to the soil, helps it to retain moisture, modifies its temperature, hastens chemical action and renders it easier of access to the air.

All these processes were being carried on upon the earth long before the appearance of any of the land animals whose work is rather that of improving the soil than of forming it. Such work is done by the angleworms, ants and many others whose digging serves to overturn and aerate the soil, and so proves of inestimable value to man. Their excrement and, later, their decaying bodies also add to the soil's fertility.

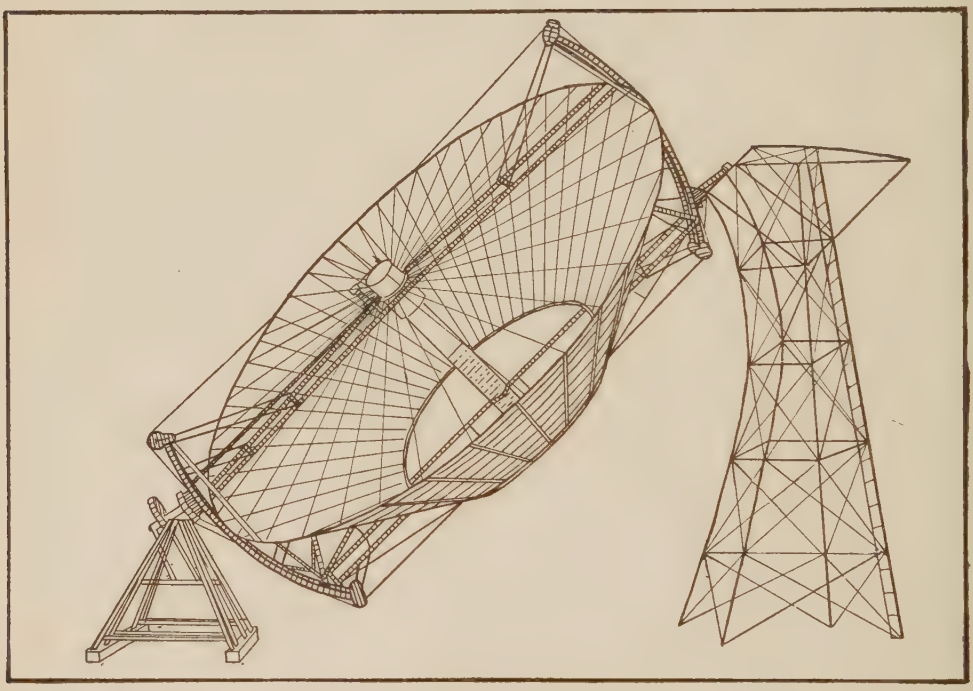
KINDS OF SOIL. By the kinds of soil its composition, rather than its texture and structure, is referred to; as, for example, a solid rock and a fertile field may have the same constituents, though the former is not fitted in texture for giving up its food to plants. The commonest kinds of soil are those known as sandy, clay, loam, muck and alkali. None of these is of definite chemical composition, and the majority of soils are a combination of some eight of the common chemical elements, oxygen, silicon, aluminum, iron, calcium, magnesium, sodium, potassium. Sandy soil is generally spoken of as a light soil, although by actual weight it is the heaviest. It is made up chiefly of particles of quartz and so loses its moisture readily; the humus, or decaying organic matter, is also easily lost. Sandy soil is good for few crops; fruits and some vegetables may be successfully grown, but in order to raise the ordinary farm crops the physical conditions of the soil must be changed. Foraging crops, as rye, buckwheat, etc., may be grown and plowed under. Fertilizer to be effective should be applied not much in advance of the planting of the crop, and should contain much lime, a constituent which is lacking in sandy soils.

Clay, on the contrary, holds much moisture. If worked when wet, it has a tendency to bake; when dry it is too hard. Most clayey soils need drainage. Fertilizers containing lime to render the soil porous should be applied early, as they are not easily absorbed. Clay soils are generally very productive when well tilled.

Loam is probably the most satisfactory for general purposes. It is of very indefinite composition, but is supposed to consist of one-half clay and one-half sand. When the sand predominates, it is called sandy loam; when the clay, it is called clay loam. Muck is soil containing an ususual amount of vegetable matter. Since it holds much moisture it ordinarily requires draining. Chemically, it lacks potash and phosphoric acid, but contains much nitrogenous matter. Alkali soils in the United States are found chiefly in the West. They are formed by the decomposition of rocks in regions where there is insufficient rainfall, and are fitted only for raising alfalfa, sugar beets and clover. See ALKALI.

For helpful reading on soils consult: Bailey, *Principles of Agriculture* (1909); Wilcox and Smith, *Farmers' Cyclopedia of Agriculture;* Bailey, *Cyclopedia of American Agriculture;* Burkett, *Soils.*

Soko'tra, or **Socotra,** an island in the Indian Ocean, lying at the entrance to the Gulf of Aden. It is 80 m. long, 55 m. broad and has an area of 1382 sq. m. The climate is dry and hot and there is little agriculture. The flora embraces an abundance of aromatic plants, including frankincense, myrrh and aloe. In 1886 it was annexed by Great Britain. The population, consisting chiefly of Hindus, Arabs and aborigines, called the Sokotri, is estimated at 12,000.



SOLAR MOTOR

Sol, in myths, Latin name for the sun god, Helios. See HELIOS.

So'lar Engine, or **Solar Motor,** a mechanical arrangement of lenses with reflecting mirrors by which the sun's rays may be utilized for producing heat to make steam and drive an engine. Inventors have attempted for many years to use the direct rays of the sun as a substitute for coal, wood or other fuel, and a so-called burning mirror was produced in France, made by Villette, which was four feet in diameter, and from which was obtained a heat so intense as to melt cast iron in 16 seconds. Parker built in England a lens about three feet in diameter, which melted cast iron in three seconds, and also fused granite. Sir William Herschel operated a machine in Africa, and Ericsson made a number of experiments in solar motors and exhibited one in New York in 1884, but the most successful solar motor was built at South Pasadena, Cal.

This machine has a disk, or circular reflector, composed of 1788 mirrors arranged around a diameter of 33½ ft. and resembling in form a huge umbrella frame, with its top portion cut squarely off. A tower of steel supports this reflector on its larger rim and provides a pivot by which it is swung around to catch on its inner surface the rays of the sun, which are reflected into lenses. The lenses focus the rays on a steam boiler, thus producing sufficient heat to gen-

erate steam and drive the engine. A clockwork mechanism regulates the swing of the reflector so as to catch the sun's rays at all times of day. The engine is provided with automatic oilers and requires but little attention after the disk is once turned facing the sun. It develops about 10-horsepower and is employed for pumping water for irrigation. A number of these engines are in successful operation at Cairo, Egypt.

Solar Mi'croscope, an instrument similar in all respects to a magic lantern, except that it derives its light from the sun's rays, which are received and reflected by mirrors. It is used for magnifying small objects, such as insects or parts of insects. See STEREOPTICON.

first group are Mercury, Venus, Earth and Mars; and those of the second group are Jupiter, Saturn, Uranus and Neptune; the orbit of the last, so far as known, forms the boundary of the solar system. Each planet is described under its title.

In size, the planets vary from Mercury, which is about one-fourth the size of the earth, to Jupiter, which is 1300 times as large as the earth. Some ingenious mathematician has made the following comparisons, which show approximately the relative size of the sun and the planets: "If we represent the sun by a gilded globe two feet in diameter, we must represent Mercury by a mustard-seed; Venus, by a pea; Earth,

PLANET	MEAN DIAMETFR IN MILES	DISTANCE FROM THE SUN IN MILLIONS OF MILES	AXIAL ROTATION	PERIOD OF REVOLUTION	VELOCITY IN MILES PER SECOND	SATELLITES
Mercury	3,030	36	88d.	88 d.	29.55	
Venus	7,700	67.2	225d.	224.7 d.	22.61	
Earth	7,918	92.5	23 h. 56 min. 4.09 s.	365.26 d.	18.38	1
Mars	4,230	141	24 h. 37 min. 22.7 s.	687 d.	14.99	2
Jupiter	86,500	483	9 h. 55 min. 20 s.	12 y.	8.06	8
Saturn	71,000	886	10 h. 14 min.	29.5 y.	5.94	10
Uranus	31,900	1,782	Unknown	84 y.	4.20	4
Neptune	34,800	2,792	Unknown	165 y.	3.35	1

Solar System, that portion of the universe which contains the sun and its attending planets, satellites, comets and meteors. The sun is the center of the system and sheds light and heat to all the surrounding bodies. It is about 750 times larger than all the other bodies in the system, and by its power of attraction holds the planets in their respective positions as they revolve about it in nearly circular paths. The planets are known as major planets, eight in number, and minor planets, also called asteroids and planetoids. They are much smaller than the major planets, and their number is unknown. About 700 have been discovered (See PLANETOID). The planetoids divide the major planets into two groups, the first group lying within and the second without the orbits of the planetoids. Named in the order of their distance from the sun, the planets of the

by another; Mars, by one half the size; Asteroids by the motes in a sunbeam; Jupiter, by a small-sized orange; Saturn, by a smaller one; Uranus by a cherry; and Neptune, by one a little larger."

The diagram shows the relative distances of the planets from the sun, the position of the planetoids and the shape of the orbits of the comets.

The table shows the mean diameters of the planets, their distance from the sun, axial rotation, period of revolution, velocity in their orbits and number of satellites.

The distance from the sun to Neptune, the outermost planet, is so great that it is beyond our comprehension, yet the solar system is probably but one of many similar systems in the universe. So great is the distance between it and the nearest fixed star, doubtless the center of another system, that the sun and its planets

have been likened to a little group of islands in the great ocean of space. Besides articles on the special planets, see SUN; PLANET; SATELLITE.

SOLAR SYSTEM

Sol'der, an alloy used in joining the surfaces of metals. A solder must melt at a lower temperature than the metal to which it is applied. The composition of a solder varies with the use for which it is intended. Soft solder used in soldering tin is composed of one part lead and two parts tin. A better grade consists of two parts lead and one part tin. Hard solders used in soldering gold, silver and platinum vary in composition. That for silver consists of equal parts of silver and brass, with a little zinc. The surfaces to be soldered should be cleaned and freed from oxide.

Soldiers', *Sol' jers,* **Homes,** homes for disabled soldiers of the regular or volunteer armies of the United States. The first home was founded by act of Congress in 1851. There is a United States Home for Regular Army Soldiers in the District of Columbia, and there are several homes for soldiers of the volunteer armies, located at various points. The home in the District of Columbia receives only soldiers of the regular army who have served 20 years (including volunteer service, if any) as enlisted men, or those who have served in any war, and all soldiers who have served during a shorter period who have been so seriously injured or who have contracted disease to such an extent while in service as to disable them for further service. If one wishing to enter this home is a pensioner, he may assign his pension, wholly or in part, to a parent, wife or child. If the pension is not assigned, it is held by the treasurer of the home in trust, such part of it being paid to the pensioner as may be thought advisable by the treasurer, and the balance being kept, and returned to the pensioner upon his discharge from the home. The inmates are subject to the Rules and Articles of War, the same as when they were in the army. They are well taken care of, have free medical attendance and medicine, and are clothed, sheltered and fed. Applications for admission may be addressed to the Board of Commissioners, Soldiers' Home, Washington, D. C., and must give dates of enlistment and discharge, letter of company and number of regiment, rate of pension and medical certificate.

National homes for disabled volunteer soldiers are located at Dayton, Ohio, Milwaukee, Wis., Togus, Me., Hampton, Va., Leavenworth, Kan., Santa Monica, Cal., Marion, Ind., Danville, Ill., Jackson City, Tenn., and Hot Springs, S. D. About 35,000 are cared for in these homes. There are state homes for disabled volunteer soldiers as follows: Yountville, Cal., Monte Vista, Colo., Norton Heights, Conn., Boise, Idaho, Quincy, Ill., Lafayette, Ind., Marshalltown, Iowa, Fort Dodge, Kans., Chelsea, Mass., Grand Rapids, Mich., Minnehaha, Minn., St. James, Mo., Columbus Falls, Mont., Grand Island and Milford, Neb., Tilton, N. H., Kearney and Vineland, N. J., Bath and Oxford, N. Y., Lisbon, N.

D., Sandusky, Ohio, Roseburg, Ore., Erie, Pa., Bristol, R. I., Hot Springs, S. D., Bennington, Vt., Orting and Port Orchard, Wash., Waupaca, Wis., and Cheyenne, Wyo.

The stipulations for entering these homes for volunteer soldiers are an honorable discharge and disability; and regulations are quite similar to those for regular soldiers, given at length above.

Sole, a family of sea fish which from their structure are supposed to be degenerate flounders. Like the flounders, members of this family have the twisted cranium which brings both eyes upon the right side of the body. The soles have scaly heads, small, close-set eyes and a tiny, twisted mouth, containing few teeth. There are about 150 species inhabiting the sandy beds of warm seas not far from shore. There are three genera, known respectively as the broad soles, the true soles and the tonguefish. The first are chiefly American, though a few species are found in Japan and China and are well known because of their ascending the rivers of the South during spawning season. One of these is locally known as the hogchoker. Although the flesh is of excellent flavor the American sole is too small to be a valuable food fish. The tonguefish are distinguished by having their eyes on the left, rather than the right, side. These are found in waters about Japan, India, southern Europe and the United States from North Carolina south.

Sol'omon (peaceful), the second child of David and Bathsheba, third King of Israel. At his accession Solomon was a youth of about 20, and his reign began auspiciously. He chose as the greatest blessing that could come to him, an understanding heart, and not only this, but honor and riches as well, came to him. His kingdom extended from the Euphrates to the Mediterranean, the outlying territories paid him tribute, foreign kings did him homage and brought him presents, while the young ruler, by means of treaties, built up an extensive commerce. Israel prospered as never before.

Solomon used a part of his vast wealth to build a magnificent palace and the Temple which David had desired to build. Hiram, King of Tyre, with whom Solomon had friendly intercourse, furnished both timber and skilled workmen for the erection of the Temple. Solomon was wise and just in his legal decisions and a good organizer, but even at the height of his glory the seeds of rebellion and disunion were being sown. The King himself became licentious, admitting foreign women into his harem, idolatry crept into the land, the kingdom became enervated. After reigning 40 years he died, B. C. 937, leaving his country on the eve of a revolution which culminated in the division of the kingdom into two parts, Israel and Judah. Rehoboam, Solomon's son, ruled over two tribes comprising the Kingdom of Judah. The ten tribes of Israel, the northern kingdom, were ruled by Jeroboam. See JEROBOAM; ISRAEL, KINGDOM OF; JUDAH, KINGDOM OF.

Solomon Islands, a group of islands of the Pacific Ocean lying between the equator and 10° south latitude and forming the eastern extremity of the Indian Archipelago. They consist of two almost parallel chains, part of which are of volcanic and part of coral formation. Since they lie near the equator the climate is hot and the moisture is excessive. The mountains, some of which rise to a height of 10,000 ft., are thickly clothed with forests and tropical vegetation. Copra, or the dried meat of the coconut, tortoise shell, ivory, sandalwood, nuts and tropical fruits are exported, and coffee and cocoa are raised for home consumption. Politically the Solomon Islands are to a large extent governed by Great Britain. Their total area is 16,950 sq. m. and their total population, 180,000, most of whom are negroes.

Solomon's Seal, a woodland member of the Lily Family, having a thickened root with scars upon it, which are supposed to resemble seals. The drooping stem bears smooth, clasping, green leaves, not opposite, and beneath each of the lower leaves hangs a pair of green-

ish-white, bell-shaped flowers, which appear in May. The fruit is a dark blue berry. The false Solomon's seal has the same leafy stem, with clasping, narrower leaves and white flowers in a bright cluster at the end of the stem. Both genera grow in the United States west to Kansas.

SOLOMON'S SEAL

Solomon's Song. See SONG OF SOLOMON.

So'lon (639-559 B. C.), the first great legislator of Athens. At the risk of his life he dared to urge the Athenians to recover Salamis. He became chief archon in 594 B. C., with power to draw up a new constitution for the Athenians. He divided the citizens into classes based on wealth, and made the public assembly more powerful and more democratic. He made wise laws for trade and commerce, reduced debts so that they no longer burdened the debtors, and made it illegal to reduce anyone to slavery on account of debt.

After the Athenians had accepted his constitution Solon bound them by an oath not to make any changes in it for ten years. He then traveled in the East for ten years and returned to find the state torn by factions. So great was his influence that all parties agreed to yield to his decision. When Pisistratus seized the power a little later, Solon left Athens. Though Pisistratus was a tyrant, his power was really based on the favor of the people, and he wisely used the forms of Solon's constitution in his government.

Solstice, *Sol' stis,* the point in the ecliptic where the sun is farthest from the celestial equator. There are two solistices: the summer, occurring June 21, and the winter, occurring Dec. 21. At the summer solstice the sun's rays are vertical at the Tropic of Cancer. They fall 23½° beyond the North Pole and within 23½° of the South Pole. At this time the sun stops in its apparent northward course, and after a few days begins to retreat towards the south. From this circumstance the name solstice (sun stands) is derived. At the winter solstice the sun pauses in its southward course and begins its return to the north. See ECLIPTIC; CELESTIAL SPHERE; SEASONS.

Sol'way Firth, an inlet of the Irish Sea, forming the estuary of the Esk and separating Cumberland from Scotland. Its length is 33 m. and its width sometimes increases to 20 m. The spring tides frequently rush in at a rate of 8 to 10 m. an hour.

Solyman, *Sol' i man,* **II** (about 1495-1566), also known as Solyman the Magnificent, Sultan of Turkey. He succeeded his father Selim I in 1520. Within a year he put down the rebellions in Syria and Egypt, concluded a peace with Persia and captured Belgrade. He next took possession of the Island of Rhodes. He attacked Hungary, captured Buda and Pesth and began an advance on Vienna, but was defeated and compelled to retreat. But between 1541 and 1547 he again overran Hungary, when the Truce of 1547 ended hostilities. In the latter part of his reign he attempted to capture Malta and again attack Hungary, but he died before his preparations were completed. Solyman's brilliant military successes extended his domains and greatly increased the prestige of his empire.

Somaliland, *So mah' le land",* an indefinite region of eastern Africa bordering upon the Gulf of Aden and divided in possession among the French, Italian and British. The people are chiefly of the Hamitic race and of the Mohammedan religion. See ITALIAN SOMALILAND; FRENCH SOMALILAND; BRITISH SOMALILAND.

Somerville, *Sum' er vil,* **Mass.,** a city of Middlesex Co., adjoining Boston, on the Mystic River and on the Boston & Albany, Boston & Maine and other railroads. Electric railways radiate in all directions and connect the city with Boston, Cambridge, Newton, Chelsea and the near-by towns and cities. The Mystic River is here spanned by two bridges, and separates Somerville from Chelsea on the east and Cambridge on the west. The city is a residential and manufacturing suburb of Boston, of which industrially it forms a part. Many places of historic interest add to its attractiveness. The city contains many public and benevolent institutions. It is situated in the Mystic Valley, along a ridge of hills, of which the largest are Clarendon, Prospect, Spring, Winter and Central hills. Many elegant suburban residences of Boston business men are located here. Among the institutions and public buildings are the Somerville Hospital, homes for the aged, state armory and public library.

The industrial establishments of Somerville include extensive slaughtering and meat-packing houses, tanneries, distilleries, bleaching and dyeing establishments, oil refineries, tube works and manufactories of jewelry, desks, picture frames, electric goods, glass, brick and cigars.

Somerville, originally a part of Charlestown, was settled in 1630. In 1631 the first vessel built in Massachusetts, named *The Blessing of the Bay,* was launched from Governor Winthrop's Ten Hill farm on the Mystic River. During the Revolutionary period several fortifications were built on the Somerville hills. The old Powder House, where the powder for the American army was stored, during the Revolutionary War, and Prospect Hill, where Washington is said to have first unfurled the American flag, are noteworthy points of interest. A city charter was granted in 1871. Population in 1920, U. S. census, 93,033.

Somnambulism, *Som nam' bu liz'm,* or **Sleepwalking,** a peculiar condition, occurring during sleep. While in this state the subject walks about and acts about as he would if awake, but without consciousness. Not infrequently the somnambulist performs feats which would be impossible for him in a state of consciousness. There are many recorded cases of somnambulists who have risen from bed, dressed themselves and walked long distances from home, passing over dangerous places without injury, and again have talked intelligently if engaged in conversation. On waking there has been no recollection of any one of these acts. Somnambulists should never be awakened if found in dangerous situations. They are usually nervous and excitable persons and in less peril if left to their own devices than if shocked by sudden fright. Artificial somnambulism is induced by hypnotism. The causes of somnambulism are not understood.

Som'nus, (sleep), in ancient myths, son of Nox (night) and twin brother of Mors (death), was a deity of the underworld and god of sleep.

Song of Solomon, a Hebrew poem forming one of the books of the Old Testament, called in the Hebrew idiom *Song of Songs.* It is thought to be the composition of Solomon, but the date at which it was written is not certainly known. Some modern critics, however, attribute it to an author of northern Israel, who wrote it shortly after the death of Solomon. The Jews regarded the book as a spiritual allegory, the lover typifying God; the beloved, the people of Israel. An interpretation of the early Christian Church made the lover represent Christ; the beloved, the soul of man. See BIBLE, subhead *The Old Testament.*

Song Thrush. See THRUSH, subhead *Wood Thrush.*

Son'net. See POETRY, subhead *Sonnet.*

Sons of Liberty, originally the name of a society organized in Connecticut in 1765 to promote theological liberty. In 1765 Isaac Barré, in a speech in Parliament, applied the name to the entire body of American patriots. They advocated the Non-Importation Agreement

and in 1774 proposed the organization of the Continental Congress. The membership consisted largely of the younger men in the colonies.

Sons of Veterans, a patriotic society organized in Philadelphia in 1879. Membership is confined to the male descendants over 18 years of age of honorably discharged soldiers, sailors or marines who served in the Union army or navy during the Civil War. The purposes of the organization are similar to those of the Grand Army of the Republic. The affiliated women's organization is known as the Sons of Veterans Auxiliary. See GRAND ARMY OF THE REPUBLIC; WOMAN'S RELIEF CORPS.

Soot, a fine, black substance consisting chiefly of carbon and formed by incomplete combustion, generally of coal. Soot accompanies smoke and is generally found on the inner sides of smokestacks. It is largely diffused into the atmosphere with smoke, where it meets cool and damp surfaces and is condensed on them. It is estimated that the city of London annually produces between 50,000 and 75,000 tons of soot. Soot consists of carbon more or less tarry, with sulphates, chlorides and ammonia. Soot produced from burning wood contains less carbonaceous matter and oils. See COAL; COMBUSTION; LAMPBLACK; SMOKE.

Sophists, *Sof' ists,* (from Greek *sophistēs,* wise man), the name given by the Greeks to certain thinkers and teachers who appeared in the fifth century B. C. in Athens and throughout Greece. They did not claim to be philosophers; but, despairing of the attainment of philosophic truth, and claiming that the right aim of intellectual endeavor was "virtue," they directed their efforts toward preparing men for civic life. This they did by teaching, at various periods, culture, rhetoric, disputation and politics.

Nevertheless, they occupied a distinct place in the history of philosophy and formed the transition from the earlier philosophies to Socrates. The preceding philosophers had tacitly assumed that the objective world is the source of knowledge and is reflected in a valid way in subjective consciousness. The Sophists introduced a new principle, that of subjectivity. According to them we do not know what things *are,* but only how they *appear* in individual consciousness. Universally valid knowledge is therefore impossible. The Sophist philosophy was thus of a negative character. It overthrew the earlier systems and led to philosophic skepticism. But for that very reason it furthered the progress of philosophy by driving it to more substantial ground. The Sophists also rendered valuable service in the various learned professions and as teachers in all branches of knowledge. Their efforts in disputation to win victory rather than to establish the truth has given currency to our word *sophistry.* See PHILOSOPHY, subhead *History.*

Sophocles, *Sof' o kleez,* (about 496-406 B. C.), an Athenian dramatist, born at Colonus, a suburb of Athens. His was an unclouded life of happiness,—an ideal type of manhood, on which were bestowed almost all the prizes and honors that Athens could give to one distinguished for exceptional beauty, grace and genius. In B. C. 440 he served on the board of generals for the Samian War, but his life was chiefly devoted to literature, and his first play, the *Triptolemus,* was produced when he was 28. About 20 times he carried off the first prize in the contests and never fell below second place. The new features of his dramas were: the increase in the number of the members of the chorus from 12 to 15, the introduction of a third actor and the insistence on making each play an independent dramatic and psychological unity. There are human qualities and tragic pathos in his work, as well as a serene and unfailing beauty. Among his works are *Ajax, Antigone, Electra, Œdipus Tyrannus, Trachiniæ, Philoctetes* and *Œdipus at Colonus.*

Sorata, *So rah' tah,* an extinct volcanic peak of the Andes, situated in Bolivia, about 60 m. n.w. of La Paz. It rises in two summits, Ancohuma and Ilampu, whose altitudes are respectively

21,490 and 21,275 ft. The name Ilampu is sometimes applied to the whole mountain. It is one of the highest peaks in South America.

Sorbonne, *Sor bon',* a famous college in the Latin Quarter of Paris. It was named from its founder, Robert de Sorbon (1201-1274), chaplain of Louis IX, and was founded in 1252 as a theological school for poor students. Its severe examinations early gave it a high standard and its decisions were eagerly sought in the theological controversies and struggles between the popes and the emperors. Cardinal Richelieu gave it a magnificent building and a larger library in 1626. As theological questions ceased to occupy the minds of the people, the power of the Sorbonne declined and it had little influence when it was suppressed in 1792.

The college was reconstructed in 1808 and the building, called the Sorbonne, became the seat of the Académie, and later the faculties of science and belles-lettres were added to that of theology. In 1884-1889 new buildings were erected, costing $4,500,000, and the present Sorbonne has 100 professors and over 10,000 students.

Sorel', a city of Canada in the Province of Quebec, at the mouth of the Richelieu River and on the Quebec Southern Railway, 42 m. n.e. of Montreal. The city is connected during the summer by a daily steamer with Montreal and Quebec. It is the distributing center for a large country district, and possesses several shipbuilding yards. There is good fishing and hunting in the neighborhood. The leading industries include founding, sawmilling and the manufacture of agricultural implements, plumbers' supplies, sash and doors, native wines, clothing and aerated waters. Population in 1911, 8420.

Sor'ghum. See Sugar, subhead *Sorghum.*

Sorolla Y Bastida, Joaquin (1863-), a Spanish painter, born in Valencia. He studied art in his native town and in Italy and Paris. His first notable success, *Another Margaret,* was awarded a gold medal in Madrid. Thereafter his advance was rapid, and he shortly became the head of the Spanish School of painting. In 1900 he won a medal of honor for his exhibit at the Paris Exposition, and in 1906 he received appointment as Officer of the Legion of Honor. His works are to be found in the Berlin National Gallery, at the Venice and Madrid museums and in various private collections in Europe and America, and include figure subjects, landscapes and portraits. Especially noteworthy is his treatment of sunlight, particularly in marine studies.

Sor'rel, a low weed of the Buckwheat Family, found growing in fields or on cultivated ground all over the United States. It is a stemless plant with numerous leaves lying in a loose rosette upon the ground, or, if conditions are favorable, rising on slender stems to a height of six inches or more. The leaves are broadly arrow-shaped and somewhat fleshy, having an agreeable, sour taste. The flower stem is slightly leafy and rises high above the rest of the plant, producing a branched spike of rusty-red flowers. On one plant will be found staminate flowers, or those carrying the stamens with the fertilizing dust, and on another, pistillate flowers, or those having pistils which will ripen into the fruit. Thus the sorrel depends on honeybees and moths for fertilization. In dry situations the leaves and stem of the sorrel are apt to turn a rusty-red color which gives the whole plant a burnt appearance. Sorrel is not a great pest, as it dies out of its own accord if left long in one locality. Wood sorrel, often wrongly called sorrel, is a member of an entirely different family. See Wood Sorrel.

Sothern, *Suth' ern,* **Edward Hugh** (1859-), an American actor, born in London, England. He appeared with his father, Edward Askew Sothern, in New York, in 1879. Later he traveled in the United States and England, wrote farces and acted successfully in several light plays. In 1904 he joined Julia Marlowe in producing Shakespearean plays. They were married in 1911.

Among dramas, other than Shakespearean, in which he has made a popular appeal, are *The Sunken Bell, If I Were King, The Proud Prince, Adventures of Lady Ursula* and *Richard Lovelace.*

Soul. See MIND.

Sound, the result of certain vibrations of the air or other medium that affect the ear. In physics the vibrations themselves are the sound, whether or not an ear is present to receive them, and in this sense the subject will be treated here. For a physiological discussion of sound, see EAR.

SIMPLE EXPERIMENTS. If the moistened finger is drawn along the rim of a glass nearly filled with water, a musical sound results and the surface of the water is disturbed by tiny waves. When a thin bow is drawn across the strings of a violin the vibrations make the strings seem like indistinct bands. These vibrations that cause sound are evidently fairly slow, for they may be seen as well as heard. If the violin bow is drawn across a block of wood or the moistened finger along the edge of a cube, no sound is heard; such bodies are not of proper form or material. To vibrate and produce sound, bodies must be of suitable form and of a certain degree of elasticity; thus rods or thin plates produce sound readily and are known as sonorous bodies. For the communication of sound there must be not only a vibrating body but a medium capable of transmitting the vibrations. Air is the ordinary medium, and that sound cannot be carried in a vacuum is shown by the experiment with the alarm clock, discussed under AIR PUMP. From these experiments it is evident that when a suitable body is made to vibrate, it sets in motion the medium that surrounds it, and the vibrations of this medium, or the effect of these vibrations upon the ear, is sound.

VELOCITY OF SOUND. From the action of the waves on the glass of water we may judge that sound travels in somewhat the same way in the air as the waves travel upon the surface of the lake; it is not the water but the wave that advances. Likewise in the air it is not the air particles but the motion of these particles that is transmitted. Each little particle, as it vibrates to and fro in the direction in which the sound wave is advancing, influences the particle next to it and sets it in motion, and thus the vibration is passed on as a condensation followed by a rarefaction in the air until, far distant from the source of the sound, the vibration is weaker and weaker and is finally exhausted. As has been said, sound travels so slowly that its investigation is comparatively simple. Probably every one has noticed that when a person at a distance strikes a blow with a hammer, the sound of the blow comes at an appreciable interval of time after the hammer has been seen to fall. This should suggest a simple method of determining the velocity of sound, or the rate at which it travels. Other commonly observed incidents of the same sort are noticed; as the report of a gun heard after the flash; the thunder following the lightning; and the wavelike motion of a procession marching to the strains of a single band.

Experiment shows that sound travels in air 1090 ft. per second at 0° C. or 32° F. Since an increase of temperature decreases the density of the air, the velocity of sound increases about two feet for each added degree Centigrade. This rate is, of course, also increased or diminished by the wind, and is modified by rain or snow. All kinds of sound, regardless of their pitch, travel at the same speed. A common method of estimating the distance, in miles, of a cloud in a thunderstorm is by counting the seconds between the flash and the report and dividing by five. (Why?)

INTENSITY OF SOUND. By the intensity of sound we mean its loudness; this loudness depends upon the amplitude of the vibration, being proportional to the square of the amplitude, and thus we strike the piano keys hard or hit a gong forcefully to produce a loud tone. As the vibrations are communicated to the surrounding air, the air particles are

made to vibrate to and fro through a greater or less distance according as the sound is loud or faint. The distance a vibrating particle moves from its mean position when at rest to its extreme position at one end of a vibration is called the *amplitude* of its vibration. In the case of a telephone receiver diaphram and the air particles near it, the amplitude of vibration varies from .2 millimeter to .001 millimeter or even less.

Pitch of Sound. This is the number of complete vibrations made by the sounding body each second, or the number of single pulses that strike the ear each second. Musical notes vary in pitch from about 30 to 4000 complete vibrations per second, though the average ear can recognize as notes sounds making from 16 to 30,000 complete vibrations per second.

Quality of Sound. The quality of timbre of a musical note depends upon the overtones present with the fundamental, and upon the relative strengths of these overtones. A tuning fork when carefully bowed yields a pure tone without overtones of appreciable strength. A violin string of the same pitch yields the same fundamental tone as the fork, but in addition it yields a note of two times, one of three times, one of four, five and six times the pitch of the fundamental, some of these extra notes being stronger than others. These extra notes, due to the string vibrating in segments, are called overtones and are what give the peculiar or characteristic quality to the complex note from such an instrument.

Reflection and Diffusion of Sound. Sound is reflected in much the same manner as light, and it is this reflection that causes sound to seem to come from a different direction from that in which its source lies (See Echo; Whispering Gallery). In the open air sounds would spread in all directions equally, except that the shape of the body producing the sound often hinders this. A person speaking in the open air can be heard equally well 100 ft. directly in front, 75 ft. at each side and 30 ft. behind him. This is not the same, however, in a building where reflection must also be taken into consideration. Sound shut off in one direction has more intensity in other directions, and upon this principle speaking tubes are of value. They prevent the spreading of the vibrations by confining them to a narrow column of air.

Sound'ing, the process of determining the depth of water and the character of the bottom of the sea by a line lowered from a vessel. Originally the line consisted of a rope marked off with the number of fathoms, and on its end was fixed a piece of lead, but in sounding in deep water it was difficult to determine when the lead had reached the bottom. These sounding leads, or plummets as they are called, are now made by having an elongated lead weight with an attachment for a wire rope at one end. Ships generally carry two plummets, one with a ten-pound lead, called the hand lead, and one with a weight of from 20 to 65 lb., called the deep-sea lead. When it is intended to determine the character and quality of the bottom of the sea, a tallow-covered arrangement is fastened to the lead on its lower side, and to this particles of sand, shells, gravel and other substances adhere when the lead strikes the bottom. For sounding depths not exceeding 500 fathoms (3000 ft.), the Tanner sounding machine is used, and for greater depths the Sigsbee machine is employed. In both machines wire rope is used, and in the Sigsbee a reel is employed, driven by steam power. Various attachments are used, and when it is required to obtain samples of the sea water at different depths, a cylinder is attached to the lead.

Magellan in his first voyage took soundings of the Pacific to a depth of 200 fathoms, and Sir John Ross in 1818 found the depth of the Arctic seas to be 1050 fathoms; while places in the Atlantic Ocean reached depths of 2425 fathoms, and twice with 4000 fathoms of line no bottom was reached. The United States Government employed the ship *Albatross*, fitted up with all the best scientific sounding machines, including

one of the Sigsbee pattern, and found a depth of 4813 fathoms in the Pacific Ocean, about 100 m. southeast of Guam. This is one of the deepest oceanic depressions in the world. See OCEAN.

Sousa, *Soo'za,* **John Philip** (1854-), an American composer and band leader. In 1892 he organized the well-known Sousa Band, with which he has made many tours throughout America, often playing his own military marches. He has written several operas, of which the most familiar is *El Capitan.*

South Af'rican War (1899-1902), a struggle between Great Britain on the one hand, and the South African Republic and Orange Free State on the other. The country was chiefly inhabited by the descendants of the early Dutch settlers of about 1652, but the discovery of the gold mines and of diamonds drew a large number of foreigners, especially the British. The Boers, as the original inhabitants were called, placed severe restrictions on naturalization and tried to keep the newcomers from acquiring any share in the government. The British Government tried in vain to secure better terms, and war was declared in October, 1899.

The Boers made a stubborn resistance and maintained a guerrilla warfare over a year after the organized struggle had ceased. During the war Orange Free State was annexed to the British dominions under the name Orange River Colony (1900). In May, 1902, they made peace with Great Britain, whereby all Boers became British subjects, and a general amnesty was declared. The Dutch language was to be taught in the public schools wherever it was desired. The territory became a part of the British possessions under the name of Transvaal Colony. The commercial interests led to a sentiment for a closer union among the people, and in 1909 the Act of the Union was passed, which united South Africa after 70 years of discord. See SOUTH AFRICA, UNION OF.

South Africa, Union of, a Union constituted by the South Africa Act of 1909. By the terms of the act the self-governing British colonies of the Cape of Good Hope, Natal, the Transvaal and the Orange River Colony became united on May 31, 1910, in a legislative Union under the name of the Union of South Africa. The four colonies became original provinces of the Union under the names of the Cape of Good Hope, Natal, the Transvaal and the Orange Free State. This great dominion comprises 473,184 sq. m. and is divided into the four provinces named above. The act which established this Union provided for a governor-general appointed by the Crown; an Executive Council; a Senate of 40 members, eight of whom are appointed and 32 elected; a House of Assembly elected by the people; and a Provincial Council for each province. Pretoria in the Transvaal is the capital.

In general the country is rugged, with lofty plateaus and rising mountain ranges, which reach their greatest height in the Transvaal. The Orange, the Vaal and the Limpopo rivers drain this region, and the climate is generally subtropical, although in the more elevated regions it becomes more temperate. The chief occupations are agriculture and mining. Grains are abundantly raised and large herds of cattle and sheep are pastured upon the veldts. Fruits are cultivated in Cape of Good Hope Province, and vine raising there also proves an important industry. Natal, in the section once known as Zululand, has extensive forests. The mineral resources are gold, diamonds, coal, copper, iron, tin, lead, zinc and manganese, but only the first three are extensively mined.

The colonies from which the Union was formed have had a troubled existence. Cape Colony was the first settled and was the home of Dutch colonists who came in 1652. This colony was seized by the British in 1795, and the Dutch inhabitants, now called Boers, found their way into Natal in 1837, and later into the Transvaal and the Orange Free State. At the time of the discovery of the diamond mines in Kimberley the British entered in such numbers that the Boers feared to lose their nationality,

and so refused the foreigners, or "uitlanders," a voice in national affairs. The uprising against the Boer Government began with the Jameson Raid in 1895, and was aided by the English in 1899. After heroic resistance and a succession of brilliant victories, the Boers were outnumbered and compelled to yield. Guerrilla warfare, however, did not wholly cease until 1902. The Union now formed, with its system of free government, bids fair to be the solution of the South African problem and to hasten the development of this region. Some of the difficulties already met are: the question of a common language; the status of the Asiatics; the question of immigration; and the military defense. The principal cities are Pretoria, the capital; Pietermaritzburg, Kimberley, Cape Town, Johannesburg and Natal. The total population is about 6,000,000. See SOUTH AFRICAN WAR.

South Amer'ica, the fourth largest of the continents, situated in the southern part of the Western Hemisphere. It lies between 12° 45′ north and 55° 30′ south latitude and between 35° and 81° 30′ west longitude. The most westerly point of the continent is directly south of the Florida Peninsula; hence South America as a whole lies farther east than North America.

SIZE. The greatest length of the continent from north to south is about 4800 m.; it extends 3300 m. from east to west. The total area is 7,700,000 sq. m. Its shape is roughly triangular, with the base at the north and the apex at the south. Unlike that of North America, its coast line is almost unbroken. Europe has an area only half as great, but a coast line longer by three-quarters. There are few peninsulas and less than one per cent of the surface is island territory.

COAST WATERS AND ISLANDS. South America is practically surrounded by the ocean. The Atlantic is on the north and east and the Pacific is on the west. The Isthmus of Panama, 45 m. wide, joins the continent with that of North America. The northern coast of South America is washed by the waters of the Caribbean Sea, with its two gulfs, Darien and Venezuela, and the Lagoon of Maracaibo. On the east and southeast are the gulfs of São Marcos, Bahia and San Matias, and St. George Bay. The only large gulf on the west is that of Guayaquil; the Gulf of Panama washes the outer coast of the isthmus. The important islands off the north coast are the Curaçoa group, Margarita and Trinidad. The Falkland Islands lie due east of the southernmost part of the continent. The Strait of Magellan cuts off from the mainland the Island of Tierra del Fuego. Along the western coast are Queen Adelaide Archipelago, Wellington Island, Chonos Archipelago and Chiloe Island.

PHYSICAL FEATURES. The relief features of the two Americas are alike in the one respect—that a great system of elevation extends along the western coasts of both, stretching from the Alaskan Peninsula in North America to Cape Horn in South America.

Highlands. In South America this mountain system is known as the Andean Cordillera. The Andean Mountains and the Brazilian and Guiana highlands constitute the principal elevated areas. The Andes stretch along the Pacific coast in a continuous chain for over 4000 m. (See ANDES). The Guiana Highlands are irregular in configuration, and are highest in the west. The Brazilian Highlands reach a height of nearly 8500 ft. near the Tropic of Capricorn; the average altitude in this region is from 4000 to 5000 ft. Its highest point is Itatiaia, about 10,000 ft.

Lowlands. These elevations divide the continent into five natural lowland regions. West of the Andes is a narrow strip of land, scarcely more than 100 m. in width, extending to the Pacific Ocean. Between the Andes on the west and the Plateau of Guiana on the east is a valley, the basin of the Orinoco, formed of plains or steppes, known as *llanos.* A third depression is the Amazon basin; south of it are the *pampas,* or open steppes, of Argentina; the pasture lands

of Brazil bounded by the Paraná and the Uruguay rivers on the west and the wooded coast along the Atlantic Ocean on the east form the fifth valley.

Rivers and Lakes. The drainage of South America is principally into the Atlantic Ocean. The three great rivers are the Amazon, the Orinoco and the Plata. The Magdalena drains the northwest of South America; the Orinoco, the region between the Andes on the west and the Plateau of Guiana on the east. The Amazon basin includes about one-third of the area of South America. The Amazon is the largest river in the world. Other rivers are the Cassiquiare, connecting the Orinoco and the Amazon; the Tocantins, flowing into the Pará estuary; the São Francisco; the Plata, formed by the Paraná, the Paraguay and the Uruguay rivers; the Colorado, the Negro and the Chubut. The principal lake is Lake Titicaca, in the Andes. The others are small and insignificant.

Geology. The eastern highlands of South America are remains of a huge mountain system which has gradually worn away and filled up the intervening valleys. The Andes are composed of ranges of more recent origin and of varying geologic age. Minerals are abundant. Among the principal minerals and metals are diamonds, gold, silver, mercury, copper, iron, coal, lead, bismuth and antimony. The Brazilian gold and diamond mines have yielded large supplies. The Andes contain fairly an inexhaustible wealth of different minerals. Bolivia has large silver mines and in Chile are found copper, silver, coal, guano, niter, borax and iodine compounds. The Potosi mines were first discovered by the Spaniards.

Climate. Lying on both sides of the equator, South America does not have the wide range of temperature of North America. Even the tropical climate is fairly equable and because of its elevations this region does not suffer from intense heat. The Cordilleras divide the continent into two very different climatic areas. The western coast receives winds from the ocean which modify the temperature, lowering it in the summer and causing it to rise in the winter. East of the Andes, the Amazon basin, affected by trade winds saturated from the Atlantic, receives an abundant rainfall. The precipitation at times reaches 200 inches. The winds are without moisture after having crossed the mountains, and the western slopes are generally dry. In the southern part of the continent conditions are reversed. The winds from the west cause rainfall on the coast, while the southeast is dry nearly the year round. The winter months are June, July and August; the summer months, December, January and February.

Plant Life. Latitude, altitude, and rainfall determine the variations in vegetation. The equatorial region is exclusively tropical in its plant life, and abundant rainfall causes a profuse plant growth. The tropical forests consist principally of palms, tree ferns and bamboos. The trees of other regions include mahogany, cedar, araucaria, beech, ebony, wax palm, rubber tree, Brazil nut tree, cannon-ball tree, cinchona, bamboos and figs. Some of the most gorgeous flowers are the orchids and the Victoria regia. An impenetrable jungle covers large tracts of forest area. Rice, coffee, sugar, agave, arrowroot and cotton have been introduced within the last centuries. The potato is indigenous to the soil. The chinchona yields quinine, and the coca, cocaine, two of the principal medicines obtained from South America. Various other shrubs and plants grow in abundance. The llanos of the Orinoco contain tall grasses; the pampas, or plains, of the Plata are also grass-covered, except in southern Argentina where the dry climate stints or checks all growth.

Animal Life. The fauna of South America is distinct and isolated. Its remoteness from that of North America suggests that the connection of the two continents is of recent geologic origin. Among the native animals are the alpaca and the tamed llama of Chile. Other useful species have been introduced.

Horses, cattle and sheep thrive on the extensive llanos and pampas. Tapirs, monkeys, chinchillas, peccaries, sloths, armadillos, anteaters and blood-sucking bats are also found. Dogs were plentiful during the Spanish conquest. Half-wild pigs range the plains. The birds of the tropical region are varied and many-colored. Humming birds, macaws, flamingoes, aracaris and toucans exist in great numbers. There is a rich insect life, and the butterflies in particular are distinguished for their gorgeous coloring. Those birds whose deposits formed the guano wealth were carefully guarded by the Incas. Of the reptiles, the boas, alligators, rattlesnakes, turtles and lizards are common.

Inhabitants. The natives of North and South America are without doubt of the same race, for similar physical characteristics present themselves in the inhabitants of both continents. In South America the population is most dense along the river valleys, principally that of the Plata, and along the coasts. The type varies in color, from a deeper brown of the mountains to the yellow skin of the natives of the warmer regions. Their form is slender and handsome, the hair long, lank and dark, the beard scant and the eyes deep-set. To this native population are added peoples of foreign birth, principally of Spanish, Portuguese and Italian blood. A peculiar characteristic among the native tribes of Brazil is their tendency to despondency, so great, as a result of underfeeding, innutrition and improper sanitation, as to cause a decided decrease in population because of yielding to death without a struggle. The average density of population is now 53 per sq. m. Total population, estimated at 37,500,000.

Political Divisions. The countries of South America, given in the order of their size, are: Brazil, Argentina, Bolivia, Colombia, Peru, Venezuela, Chile, Ecuador, Paraguay, British Guiana, Uruguay, Dutch Guiana and Falkland Islands. For further descriptions of these countries, see the articles under their separate titles.

History. When Columbus reached the Orinoco River in 1498, the native tribes of Colombia and Peru were in a fairly high state of civilization, but yielded rather readily to the inroads of the Spanish. Other explorers were Ojeda, Vespucius, Pinzon, Cabral, Magellan, Cortez and Pizarro. The Spanish and the Portuguese were the two European powers that had practically complete control of the continent even to the beginning of the 19th century, the Portuguese invading and conquering from the east and the Spanish from the west. After the establishment of the empire in Europe by Napoleon, an indirect result was the effort among countries of South America to create federal republics similar to that of the United States. Brazil threw off the yoke of Portugal in 1822 and became a federal republic in 1889. Other changes have occurred, and revolutions have been frequent. The question of boundaries has been one of lingering dispute.

Southampton, *South amp' tun,* an important seaport of England lying in Hampshire borough, 79 m. s.w. of London, on Southampton Water and the River Itchen. Its location and its excellent harbor with fine wharves and docks make it one of the chief Atlantic ports of entry. Southampton was formerly a walled town, and remains of its old walls and towers still stand. There are manufactories of carpets, machinery, leather goods, hardware, cottons, linens and woolens. The principal buildings are the two old churches, St. Michael's and Holy Rood, and a fine hospital. Many places of historic and literary interest lie near the city. Population estimated 125,000.

South Austra'lia, one of the original states of the Commonwealth of Australia, occupying the center of the continent east and west. It is bounded on the n. by the Northern Territory of Australia and by Queensland, on the e. by Queensland, New South Wales and Victoria, on the s. by the Great Australian Bight, an arm of the southern ocean, and on the w. by Western Australia. The area of

South Australia is 380,070 sq. m., or about the same as that of the four states, Washington, Oregon, California and Utah.

A large part of South Australia lies in the Great Australian Plain, where there is much desert region. In the south there are a few low mountains. There are several lakes of considerable size, but they are generally shallow and salty, not draining to the seas. The Murray River crosses the southeastern portion of the state and is the only permanent river of any size.

Agriculture is the great occupation of the country, and wheat, barley, oats, hay and potatoes are the most widely planted crops. Fruit raising is an important branch of the industry, and both fresh and dried fruits are extensively shipped. Grapes, currants, apples, apricots, peaches, almonds, oranges, lemons and olives are all abundantly cultivated. Stock raising is carried on upon the great plain, where horses, sheep and cattle are herded wherever pasturage is sufficient. The minerals are copper, silver and gold, but as yet copper alone is of great importance. Wool, wheat, flour and copper are the leading exports.

Adelaide, upon the Torrens River and the Gulf of St. Vincent, is the capital and the most important city. The population of the state is 408,600. See AUSTRALIA.

South Bend, Ind., a city and county seat of St. Joseph Co., 27 m. n.e. of Laporte, 135 m. n. of Indianapolis and 86 m. s.e. of Chicago, on the southern bend of the St. Joseph River near the source of the Kankakee River, and on the Lake Shore & Michigan Southern, the Chicago, Indiana & Southern, the Vandalia, the Michigan Central, the Grand Trunk and other railroads. The city is 6 m. south of the Michigan State boundary and is connected by electric lines with Elkhart, Mishawaka, Goshen, Niles and St. Joseph, Mich., and other towns and cities. South Bend is the center of a rich agricultural and stock-raising region and is an important manufacturing city. The noteworthy buildings include the city hall, courthouse, Y. M. C. A. Building, Oliver Hotel, Farmers' Trust Bldg., and substantial business blocks. There are about 50 churches, many of them of handsome architectural design. The educational institutions include a high school, 30 public and parochial schools, St. Aloysius and St. Joseph's academies, teachers' training school, a public library, a conservatory of music and a number of commercial and private schools. In Notre Dame, a near-by suburb, are located St. Mary's College and Academy for girls and the University of Notre Dame. This university, which was opened in 1842, is the headquarters of the Order of the Holy Cross. Other institutions include the Epworth and St. Joseph hospitals.

South Bend, in point of production, is the second manufacturing city of the state, being exceeded only by Indianapolis. The chief industrial establishments include carriage and wagon works, the largest in the world, plow and agricultural-implement works, lumber and flour mills, foundries and machine shops, wood-turning plants, paper and pulp mills, malleable-iron works, automobile and bicycle works, concrete machinery works and manufactories of sewing machines, toys, proprietary medicines, clover hullers, knit underwear, electrical appliances, sheet-iron products, bank and office furniture, baking powder, bluing, linseed oil, varnish, wood and paper boxes, spark arresters, mineral waters, fishing tackle, pharmaceutical supplies, brick, cement, screens, sash, blinds and doors, steel ranges, electrotypes, watches and many other manufactured products.

The site of South Bend was originally occupied by the Miami and Pottawattomie Indian tribes. Settled about 1820, the town was laid out in 1831. A city charter was granted in 1865. Population in 1920, U. S. census, 70,983.

South'bridge, Mass., a town of Worcester Co., 20 m. s. w. of Worcester and 32 m. e. of Springfield, on the Quinebaug River and on the New York, New Haven & Hartford Railroad. The chief

manufactures include eyeglasses and spectacles, optical supplies, shuttles, general cutlery and cotton and woolen goods. The town was originally a part of Charlestown but was incorporated under its present name in 1816. Population in 1910, 12,592. In 1920, 14,245.

South Car"oli'na, THE PALMETTO STATE, one of the South Atlantic States, is bounded on the n. by North Carolina, on the s.e. by the Atlantic Ocean and on the s.w. by Georgia. The Tugaloo and Savannah rivers form the southwestern boundary. The form of the state is approximately that of a triangle with unequal sides.

SIZE. The greatest length from east to west is 263 m., from north to south, 207 m. The area is 30,989 sq. m., of which 494 sq. m. are water. South Carolina is a little smaller than Maine and almost the exact size of Scotland. It is the 39th state in area.

POPULATION. In 1920 the population was 1,683,724. From 1910 to 1920 there was a gain in population of 168,324, or 11.1 per cent. There are 55.2 inhabitants to the square mile and the state's rank in population is 26.

SURFACE. South Carolina has three natural divisions, the Coastal Plain, the Piedmont Plain and the Appalachian Region. These divisions are known locally as the "low country," the "middle country" and the "up country." The Coastal Plain extends from the coast to the Fall Line. Along the coast the surface is low and in the southeastern part there are numerous salt marshes, some of which extend inland for ten miles. This part of the coast contains numerous estuaries partially enclosed by islands. Inland the surface rises by gentle slopes until the Fall Line is reached. There an elevation of 700 ft. occurs, and the rest of the plain is somewhat hilly and rolling.

The Piedmont Plateau has a fall line on its eastern boundary, and extends across the agricultural part of the state until it reaches the mountain division in the northwest. The surface rises gradually from an elevation of about 500 ft. in the east to about 1000 ft. in the hills. It is an undulating plateau broken by ridges and deep valleys. The mountain division occupies only a small area in the northwest. This is crossed by the Blue Ridge Mountains which rise abruptly from the plateau. The highest point is Sassafras Mountain, 3548 ft. high, on the North Carolina border. There are several other peaks exceeding 3000 ft., the most noted being Mt. Pinnacle, Cæsar's Head and Table Rock.

RIVERS. The principal rivers have their sources among the mountains and flow in a southeast direction across the state. A narrow area along the southwestern border is drained into the Savannah. The Pedee crosses the northeastern part of the state, and the Santee, formed by the union of several streams, the most important being the Catawba and the Congaree, drains most of the north and center. Its basin comprises about one-half the area of the state. North of the Santee is the Black, and south of it are the Lynches and the Waccamaw. All the streams flowing across the Coastal Plain have broad estuaries.

CLIMATE. The winters are short and mild and the summers are long, but they are not hot or enervating, owing to the sea breezes. The climate of the mountain region is such as to make that part of the state a favorite summer resort for the people of the low country. The mean annual temperature is 63° and the annual rainfall is 52 inches.

MINERALS AND MINING. Extensive beds of phosphate rock are found along the coast north of Charleston; these extend inland several miles to the source of the Wando River. The rock is quarried in various places and in some localities is taken from the beds of streams. Clay and kaolin are found in large quantities and the combined clay industries rank next in value to the phosphate industry. The state contains valuable deposits of marble and other building stone, iron ore, asbestos, mica and soapstone. Gold, silver, lead, copper, graphite and tin are found, and gold is mined in a few localities. Petroleum, natural gas and coal also occur.

FORESTS AND LUMBER. The mountains are heavily forested and there are forests of yellow pine, live oak and cypress on the Coastal Plain and the Piedmont Plateau. In some localities these forest regions are divided into small areas known as turpentine farms. Other regions are being deforested by lumbering operations. Lumbering is the second manufacturing industry in the state, and sawmills are found in many localities. Rosin, tar and turpentine are also important forest products.

AGRICULTURE. Agriculture is generally practiced, except in the forest regions. About 65 per cent of the farms are tilled by their owners, and the remainder by tenants. Some of these pay a cash rental and others work the farms on shares.

Soil. Each of the divisions of surface has a soil peculiar to itself. That of the Coastal Plain is very fertile and produces bountiful crops. That of the Piedmont Plateau contains sand and clay and is suitable for growing cotton and cereals. All crops common to the temperate regions can be grown in the mountain section.

Products. On the islands along the coast is raised the finest quality of long-fiber (sea-island) cotton in the world. Rice is also extensively cultivated in the lowlands bordering the marshes. Oranges, pecans, figs, olives, melons and garden vegetables are also grown in the lowlands. The interior is largely devoted to the cultivation of cotton. Corn, tobacco, wheat and oats are also raised in considerable quantities. South Carolina is the third state in the production of cotton and one of the foremost states in the production of rice. Orchard fruits, especially apples, quince and cherries are grown in the uplands. In some localities apricots and almonds are successfully raised. The state contains the largest and most successful tea garden in the United States. In other sections there are numerous vineyards.

MANUFACTURES. In 1691 the colonial assembly passed a law for rewarding inventors. This was the forerunner of the patent law code in the United States enacted about a century later. During the Revolutionary War and in the years immediately following, several factories were built. Abundant water power is furnished by the numerous streams, all of those above the Coastal Plain being very rapid. Most of these early establishments were connected with the manufacture of cotton, and the production of cotton goods is now a leading manufacturing industry in the state. Abundant water power, cheap labor and raw material grown within the state give the cotton factories of South Carolina and neighboring states a distinct advantage over those of New England, and the manufacture of cotton goods is rapidly increasing in this part of the country. South Carolina is among the leading states of the Union in cotton manufactures.

The manufacture of lumber and lumber products ranks second in importance. Then follow the manufacture of cottonseed oil, fertilizers and such forest products as rosin, tar and turpentine. About one-half of the income of the state is derived from manufactures.

TRANSPORTATION AND COMMERCE. South Carolina has over 3000 m. of railway. The main lines traverse the state from northwest to southeast and from northeast to southwest. These are trunk lines connecting the states farther south with the great cities of the North. The Seaboard Air Line, the Southern and the Atlantic Coast Line are the most important systems. These with their cross lines provide the state with ample railway facilities. The chief railway centers are Columbia, Sumter, Spartanburg and Florence. The Pedee, Santee and Congaree are navigable to the Fall Line.

The commerce of the state consists of the export of minerals, farm products, lumber, tar, rosin, turpentine and manufactured goods. The imports include such manufactures as cannot be produced within the state with profit. Charleston is the chief commercial center and seaport.

GOVERNMENT. The executive department consists of the governor, lieutenant-

governor, secretary of state, attorney-general, comptroller-general, treasurer, adjutant and inspector-general and superintendent of public instruction, each selected by the people for two years. There is also an insurance commissioner elected by the General Assembly for two years and a commissioner of agriculture, commerce and industries appointed by the governor. The Legislature consists of a Senate of 24 members and a House of Representatives of 124 members. Senators are elected for four years and representatives for two. The Legislature meets annually and sessions are unlimited.

The judicial department comprises a Supreme Court of one chief justice and three associate justices elected by the Legislature for eight years, and Circuit Courts for each judicial circuit into which the state is divided. Judges of the Circuit Courts are elected by the Legislature for four years.

EDUCATION. The present school system was established in 1868. It provides for public schools for both white and colored children throughout the state. The superintendent of public instruction is at the head of the educational system. Within the last few years remarkable progress has been made in the development and perfection of the elementary schools. Revenue is derived from state and local taxation and in some localities it is supplemented by private bequests. The University of South Carolina is at Columbia and there are many denominational colleges and academies for both white and colored students within the state.

STATE INSTITUTIONS. The school for the deaf, dumb and blind is located at Cedar Springs, and the hospital for the insane and penitentiary are at Columbia.

CITIES. The chief cities are Columbia, the capital; Charleston, Greenville, Spartanburg, Anderson, Rock Hill and Sumter.

HISTORY. South Carolina was temporarily settled by French Huguenots under Ribaut at Port Royal, S. C., 1562. In 1663 Charles II granted the territory

to eight lords-proprietors, who, seven years later, permanently settled Charleston. For a time the Carolinas were ruled by Locke's *Fundamental Constitution.* When this rule ended, the colony was formally divided into North Carolina and South Carolina in 1729, and the colonies became royal provinces. South Carolina was the first colony to form an independent constitution, May, 1776. Besides being the scene of many of the important engagements of the Revolutionary War, it furnished the leaders Sumter, Pickens, Moultrie and Marion. It ratified the Constitution of the United States in May, 1788.

The people of the state were strongly opposed to the tariff of 1832 and serious trouble was prevented only by a compromise measure enacted by the National Government (See NULLIFICATION). As soon as Lincoln was elected, the state left the Union, Dec. 20, 1860. The Civil War opened at Ft. Sumter in April. South Carolina had a voting population of 47,000; yet it sent 60,000 men to the Confederate army. The state was readmitted, 1868, when it adopted a new constitution. As a result of the carpetbag rule, the state debt grew from $5,000,000 to $20,000,000 in five years. Of recent occurrence have been the Charleston earthquake, Aug. 31, 1886; the tidal wave and storm, 1893; and the South Carolina Exposition, 1901-02. In many respects South Carolina has led the South intellectually. Consult Ransom's *Resources and Industries of South Carolina.*

GOVERNORS. John Rutledge, 1776-1778; Rawlins Lowndes, 1778-1779; John Rutledge, 1779-1782; John Matthewes, 1782-1783; Benjamin Guerard, 1783-1785; William Moultrie, 1785-1787; Thomas Pinckney, 1787-1789; Charles Pinckney, 1789-1792; William Moultrie, 1792-1794; Arnoldus Vanderhorst, 1794-1796; Charles Pinckney, 1796-1798; Edward Rutledge, 1798-1800; John Drayton, 1800-1802; James B. Richardson, 1802-1804; Paul Hamilton, 1804-1806; Charles Pinckney, 1806-1808; John Drayton, 1808-1810; Henry

Middleton, 1810-1812; Joseph Alston, 1812-1814; David R. Williams, 1814-1816; Andrew Pickens, 1816-1818; John Geddes, 1818-1820; Thomas Bennett, 1820-1822; John L. Wilson, 1822-1824; Richard I. Manning, 1824-1826; John Taylor, 1826-1828; Stephen D. Miller, 1828-1830; James Hamilton, 1830-1832; Robert Y. Hayne, 1832-1834; George McDuffie, 1834-1836; Pierce M. Butler, 1836-1838; Patrick Noble, 1838-1840; B. K. Henegan, 1840; John P. Richardson, 1840-1842; James H. Hammond, 1842-1844; William Aiken, 1844-1846; David Johnson, 1846-1848; Whitemarsh B. Seabrook, 1848-1850; John H. Means, 1850-1852; John L. Manning, 1852-1854; James H. Adams, 1854-1856; Robert F. W. Allston, 1856-1858; William H. Gist, 1858-1860; Francis W. Pickens, 1860-1862; Milledge L. Bonham, 1862-1864; Andrew G. McGrath, 1864-1865; Benjamin F. Perry, 1865; James L. Orr, 1865-1868; Gen. Edward R. S. Canby, 1868; Robert K. Scott, 1868-1872; Franklin J. Moses, 1872-1874; Daniel H. Chamberlain, 1874-1876; Wade Hampton, 1876-1879; William D. Simpson, 1879-1880; Thomas D. Jeter, 1880; Johnson Hagood, 1880-1882; Hugh S. Thompson, 1882-1886; John C. Sheppard, 1886; John P. Richardson, 1886-1890; Benjamin R. Tillman, 1890-1894; John G. Evans, 1894-1897; William H. Ellerbe, 1897-1899; Miles B. McSweeney, 1899-1903; Duncan C. Heyward, 1903-1907; Martin F. Ansel, 1907-1911; Coleman L. Blease, 1911-1915; R. I. Manning, 1915-1919; R. A. Cooper, 1919—.

South Carolina, University of, at Columbia (1801). Organized as a state college and opened in 1805, the institution has borne several different names, but it has always been a state institution. It was reorganized under its present name in 1906. It maintains schools of art, science, engineering and law, a school for teachers and a graduate school. It has a library of some 50,000 volumes. Its property is valued at upwards of $1,000,000. It is one of the oldest state institutions in America.

South China Sea, a large arm of the Pacific, from which it is separated by the Philippines and the East Indies. It lies southeast of Asia and touches the shores of China and the Malay Peninsula. It has a number of important ports—Canton, Hongkong, Manila, Saigon, Bangkok and Singapore; and the gulfs of Siam and Tonkin are large indentations of its shores formed by the irregularities of the Malay Peninsula.

South Dako'ta, THE SUNSHINE STATE, one of the West North Central States, is bounded on the n. by North Dakota, on the e. by Minnesota and Iowa, on the s. by Nebraska and on the w. by Wyoming and Montana. The Big Sioux River forms the Iowa boundary and the Missouri the eastern part of the southern boundary.

SIZE. The extreme length from east to west is 360 m., the breadth is 225 m. and the area is 77,615 sq. m., of which 747 sq. m. are water. South Dakota is larger than North Dakota, about the size of Nebraska, less than one-half the size of California and the 14th state in area.

POPULATION. In 1920 the population was 636,547. From 1910 to 1920 there was a gain in population of 52,659, or 9 per cent. There are 8.3 inhabitants to the square mile and the state's rank in population is 37.

SURFACE. The surface is divided into three regions, each having its distinguishing characteristics. The first region comprises that part of the state between the Missouri and the eastern boundary. The surface is a rolling prairie crossed by the James River, which flows through a fertile valley from 60 to 70 m. wide. The lowest point is Big Stone Lake, 970 ft., in the northeast corner. There is also in this corner a low range of hills extending from northwest to southeast. The elevation of this region increases toward the west where the Coteau du Missouri forms the water parting between the valleys of the James and the Missouri rivers.

The Valley of the Missouri is narrow, and west of the river the surface is decidedly broken. The surface features in

this part of the state are the Black Hills and the Bad Lands. The most noted section of the Bad Lands lies between the White and the Cheyenne rivers. The entire region has been dissected by erosion into ravines and gorges lined with peaks and bluffs of fantastic form. In the central part the colors are gray and buff, but in the northern part greater variety of colors and brighter tints are found. The entire region is famous for its remains of gigantic animals of a past geological age. The name Bad Lands has been abbreviated from the original name given this region by the early French explorers, who designated the region as "Bad Lands through which to travel."

The Black Hills form a mountain mass in the southwestern corner of the state and have an area of about 5000 sq. m. The name is derived from the evergreen forests which grow at the sides of the mountains. The highest peak, Mt. Harney, has an altitude of 7242 ft. East of the hills is an uplift of several hundred feet, which separates this region from the Bad Lands. The valley between these hills and the Black Hills is known as the Red Valley and was so named by the Indians because of its red soil. North of the Black Hills the western boundary has an elevation of 3500 ft.

Rivers and Lakes. Nearly the entire state lies within the drainage system of the Missouri River. The northeastern section is drained by the Minnesota into Big Stone Lake. The Bix Sioux drains the eastern tier of counties. West of this is the James flowing across the state and entering the Missouri at Yankton. The tributaries of the Missouri from the east and north are short and small, but those from the west are longer and larger. From north to south they are the Grand, the Moreau, or Owl, the Cheyenne and the White.

Climate. The state has a clear, dry atmosphere which is conducive to a healthful and bracing climate. During the summer there are occasional days when the thermometer rises above 90°, but the nights are cool and the summers as a whole are salubrious. The winters are cold, with occasional spells of extremely low temperature, but these are of short duration. Throughout the year most of the days are bright and sunny. The mean annual temperature is 45°; the average rainfall for the eastern half of the state is 22.3 inches and for the western half, 17.3 inches.

Minerals and Mining. The Black Hills region is one of the richest gold-producing regions in the United States, if not in the world. About one-fifth of the gold produced in this country yearly is taken from the mines in this region, and South Dakota ranks fourth as a gold-producing state. Considerable silver is also obtained from these mines. Other minerals found in this region are lead, tin, copper, manganese and gypsum. Granite, sandstone, limestone and marble are found in various places, and at Sioux Falls a variety of quartzite known as Sioux Falls jasper is quarried. Cement rock occurs at Yankton and along the Missouri as far north as Chamberlain. Natural gas valuable for fuel and light and for generating steam and electricity abounds in the Missouri Valley. There are valuable mineral springs in the southwestern part of the state, and Hot Springs is a prominent summer resort.

Agriculture. The soil in the valleys of the Big Sioux and James is extremely fertile. The leading field crops of this region are wheat, corn, oats, barley, forage crops and potatoes. Apples, small fruits, melons and garden vegetables are grown in large quantities. The western part of the state is suited to grazing and large numbers of horses, cattle and sheep are raised. Dairying is practiced in all parts of the state. Irrigation is common in the Black Hills region, and under the so-called dry-farming methods of tillage many crops are successfully grown in the western part of the state (See Dry-Farming).

Manufactures. The production of flour is the most important manufacturing industry, and other industries are making butter and cheese and the preparation of condensed milk. Machine shops

and other small manufactories for supplying local needs are found in the cities and larger towns throughout the state.

TRANSPORTATION AND COMMERCE. Railroads extend across the state east to west and north to south. All railroads within the state are under control of the following systems: the Chicago, Milwaukee & St. Paul, the Burlington, the Chicago & North Western, the Illinois Central, the Great Northern and the Rock Island. The eastern part of the state and the Black Hills region have adequate railway facilities, but the lines have not yet been extended to all the western counties.

The chief exports of the state are gold, flour, wheat, corn, dairy products and other agricultural produce, and the imports are manufactured goods and such foodstuffs as are not raised within the state.

GOVERNMENT. The present constitution was adopted in 1889, and has been several times amended. The executive department consists of a governor, lieutenant-governor, secretary of state, treasurer, auditor, superintendent of public instruction, commissioner of school and public lands and attorney-general, all elected for two years. The Legislature consists of a Senate of not less than 25 nor more than 45 members, and a House of Representatives of not less than 75 nor more than 135 members. The sessions are biennial and limited to 60 days.

The judicial department consists of a Supreme Court of five judges elected for six years and District Courts for each judicial district, the judges of which are elected for four years. Each county has a county judge elected for two years.

EDUCATION. The public school system is in charge of the superintendent of public instruction and the schools in each county are under the control of a county superintendent. In cities and towns good systems of graded schools and high schools are maintained. The higher educational institutions are under control of a board of regents consisting of five members appointed by the governor for six years. State normal schools are maintained at Aberdeen, Madison, Spearfish and Springfield. The state university is at Vermilion, the college of agriculture at Brookings and the school of mines at Rapid City. The state has a large school fund derived from the sale of school lands. There are also a number of denominational schools of college rank located in various parts of the state.

STATE INSTITUTIONS. The asylum for the insane is at Yankton, the school for the blind is at Gary, that for the deaf is at Sioux Falls and that for the feeble-minded at Redfield. There is a soldiers' home at Hot Springs. The penitentiary is at Sioux Falls and the reform school is at Plankinton.

CITIES. The chief cities are Pierre, the capital; Sioux Falls, Aberdeen, Lead, Mitchell, Watertown, Huron, Deadwood, Yankton, Rapid City and Brookings.

HISTORY. For the early history of the state, see NORTH DAKOTA, subhead *History*. The first agricultural settlement in South Dakota occurred at Sioux Falls, 1856, but white men have resided in substantial homes within the state since 1796. Ft. Pierre was settled about 1832. The Sioux War of 1862 caused all settlers in the region to seek safety in Yankton. After Sibley conquered the Indians, immigrants flocked into the territory and developed the wheat fields. In November, 1889, South Dakota became a state. During 1910 South Dakota had the greatest per capita increase in wealth of any state.

GOVERNORS. Arthur C. Mellette, 1889-1893; C. H. Sheldon, 1893-1897; A. E. Lee, 1897-1901; C. N. Herreid, 1901-1905; S. H. Elrod, 1905-1907; C. I. Crawford, 1907-1909; R. S. Vessey, 1909-1913; F. M. Byrne, 1913-1915; F. R. Byrne, 1915-1917; P. Norbeck, 1917-1921; R. H. McMaster, 1921—.

South Dakota, University of. Located by the first Territorial Legislature of Dakota at Vermilion in 1862, this institution received 86,000 acres of land by act of Congress in 1881, was formally incorporated and opened in 1882, and took its present name in 1891. It in-

cludes collegiate departments and colleges of law, medicine, music and engineering. Its library contains about 35,000 volumes. Its enrollment is about 900.

Southern, *Suth' ern,* Cross, a beautiful constellation in the vicinity of the South Pole, containing two stars of the first magnitude and five of the second. There are four of these stars that are very noticeable and form a cross. The stars at the upper and lower end of the cross form the pointers to the South Pole. See STARS; CONSTELLATIONS.

South'ey, Robert (1774-1843), an English poet and prose writer, born at Bristol. He studied at Westminster School and at Balliol College, Oxford, and met Coleridge in 1794. Together with one Robert Lovell, they decided to found a pantisocracy, an ideal American socialistic community, on the banks of the Susquehanna River. The plan never materialized further than the marriage of the three to three sisters, whom they were to have brought with them. After traveling about from place to place, Southey finally settled at Keswick, joining Coleridge, and began to obtain a large income from his pen, also receiving an annuity from a friend and a government pension. His personal association with Coleridge and Wordsworth has caused him to be remembered as one of the triad of Lake poets. He was appointed poet laureate in 1813. His writings include *The Vision of Judgment, Joan of Arc, Thalaba, the Destroyer, Madoc, The Curse of Kehama, Roderick, the Last of the Goths, The Doctor, The History of Brazil, Naval History, Life of Nelson* and *Wat Tyler.*

South Mountain, Battle of, an engagement of the Civil War, fought near Sharpsburg, Md., Sept. 14, 1862. Lee's force of 18,000 Confederates were overtaken at South Mountain, where they had a superior position in a pass, by McClellan's Army of the Potomac, 28,000 strong. After a battle of several hours' duration, Lee escaped under cover of darkness, taking up a position on Antietam Creek. The Federals lost 1800 men; the Confederates, nearly 2700.

South O'maha", Neb., a city of Douglas Co., adjoining Omaha on the south, on the Missouri River and on the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the Missouri Pacific, the Chicago & North Western, the Union Pacific, the Chicago, Rock Island & Pacific, the Illinois Central and other railroads. The city had a rapid growth from the time the Union Stockyards were removed from Omaha and established here. South Omaha ranks next to Chicago and Kansas City as the greatest slaughtering and meat-packing center in the country. The city also has extensive cooperage works. The chief public buildings include a Federal Building, a public library and a live-stock exchange. The first city charter was granted in 1887, and in 1901 it became a city of the first class. (Now united with Omaha.)

South Port'land, Me., a city of Cumberland Co., on the south side of Portland Harbor, or Casco Bay, opposite Portland, with which it is connected by ferry and several bridges, and on the Maine Central Railroad. It was originally a part of Cape Elizabethtown, and was separately incorporated in 1895. The principal business of the city is derived from farming, but there are iron and acid works, machine shops and shipbuilding interests. South Portland has government fortifications. A state reform school for boys is located here. Population in 1920, 9254.

South Sea Company, an English commercial company, organized in 1711 for the purpose of paying the national debt, which then amounted to £10,000,000. The company agreed to assume the debt on the condition that the government should pay them £600,000 for a specified number of years and give them a monopoly of trade with the South Seas. The profits were purely speculative, but the value of the stock was rapidly increased. In 1720 the company proposed to assume the entire national debt, which was £30,000,000, if the government so desired. In July of that year the shares of stock were quoted at 1000, and several of the leading members sold out.

This showed that the entire scheme was one for marketing stock at a fictitious value, and by the end of the year the company had collapsed, bringing heavy loss upon many investors. The event was known as the "South Sea Bubble."

South Shar'on, Pa., a city of Mercer Co., 75 m. from Pittsburgh, on the Lake Shore & Michigan Southern and the Pennsylvania railroads. Name changed to Farrell since 1910. The chief industries are coal mining and stone quarrying. There are important steel, iron and tin-plate works and manufactories of explosives, chains, lumber, stoves, horse collars, brass and other articles. Population in 1920, 15,115.

Southwest Territory, a United States territory comprising all the region ceded by North Carolina (now Tennessee), and the small portion ceded by South Carolina. This was organized as the Southwest Territory in 1790, with institutions the same as the Northwest Territory except for the admission of slavery.

Soviet, the unit of government urged for general adoption by some Socialistic thinkers. Such a step would constitute a thorough-going revision of our present system of government. That rests upon territorial units,—state, county, township, ward, etc.,—and all citizens in such areas have the right of electing those who represent them in a legislative and executive capacity,—aldermen, mayors, county officials, state and national officers. A Soviet form of government would organize the citizens into classes determined by their vocations,—as railroad operators, coal miners, steel workers,—each of which would be subdivided into smaller units,—as anthracite and bituminous miners. Each group would elect its representatives to attend to its interests in successively higher combinations extending even to state and national affairs. The United States, for instance, would be ruled by a National Soviet selected to represent the many gradations of Soviets in the United States.

The Soviet theory implies the dominance of labor in all national affairs. Russia after the downfall of Kerensky's provisional government furnishes the only instance of a Soviet government. (See RUSSIA, BOLSHEVISM.)

Sow, *Sou,* **This'tle,** an obnoxious weed of the Composite Family, native in Europe but probably introduced into the United States with grains and grass seed. It is a smooth, erect plant with tough, angular and branching stems. The leaves are much-divided, sometimes spiny, light green in color and have clasping bases. The plant grows to a height of two or three feet, and in August and September bears heads of small, deep yellow flowers. It is a scraggly weed, hard to eradicate but easily spread.

Spain, a kingdom in the southwestern part of Europe, lying between 36° and 44° north latitude and 9° 15′ west and 3° 20′ east longitude. It is bounded on the n. by the Bay of Biscay and France, on the e. by the Mediterranean Sea, on the s. by the Mediterranean Sea, the Strait of Gibraltar and the Atlantic Ocean and on the w. by the Atlantic Ocean and Portugal. The Continental area is 192,004 sq. m.; with the neighboring Balearic and Canary islands, the total area is 194,783 sq. m., equaling the combined area of California and Indiana.

SURFACE. The surface of Spain consists of a variety of striking contrasts and vast stretches of drear uniformity. Between the lofty mountains rising above the line of perpetual snow are verdant and picturesque valleys, and river basins and mountain ranges alternate from the extreme northern to the southern coast. The Iberian table-land occupies the northern and north-central part of the country. It rises to a height of from 1000 to 3000 ft., and among the important mountain ridges crossing and bounding it are the Castilian Mountains, the Cantabrian and the Sierra Morena. The Pyrenees form an effective and almost impassable barrier between France and Spain. The highest summits are Mulhacen (11,420 ft.) (the loftiest peak in Europe except those of the Alps and the Caucasus mountains), the Pico de Aneto (11,160 ft.) and the Plaza Almanzor

(8730 ft.). The two great low plains of Spain are that of Aragon in the northeast, which the River Ebro drains, and the Andalusian Plain, through which flows the Guadalquivir. Their extent is small, compared with the large tableland, but they are among the most fertile regions of Europe.

Rivers and Lakes. The watershed lies nearer to the Mediterranean than to the ocean; hence the longest rivers of the country flow into the Atlantic. Most of them are not deep, and many run almost totally dry during the hot season. They include the Ebro, Guadalquivir, Tagus, Miño, Duero and Guadiana. There are no large lakes, the Albufera, near Valencia, being the only one of importance.

Climate. The climate of Spain is continental, for, despite the long coast line, the mountains which line it form an effective barrier against the moderating influences of the sea. Due to the tableland, the winter temperature is fairly low, but there the rivers dry up during the summer and the heat is intense. On the lowlands and near the coast the climate is equable and favorable for the production of vines and for the existence of extensive orange and olive groves. Recent destructions of the forests have also affected the climate, until it is now one of the driest in Europe. A further disadvantage to productivity of the soil is the fact that the main rainfall occurs during winter, after the season of growth had ended. When irrigation is resorted to, the fertile soil yields rich returns.

Minerals and Mining. Before the discovery of America, Spain was known as the richest metal-producing country in the world, as it now is of Europe. That the mining industry has remained in the backward state in which it still is found is due in part to lack of fuel and means of communication, but also to a great extent to lack of initiative and enterprise among the inhabitants. Much of the ore that is mined is transferred in its raw state to foreign countries, Great Britain and Germany making large demands upon its resources. Coal is found in almost all provinces, but England supplies much of the home demand. More lead is produced in Spain than in any other country of Europe, and the Almaden quicksilver mines are the richest in the world. Other mineral products are copper, sulphur, salt, saltpeter, soda, graphite, potter's clay and alum.

Agriculture. The important industry of Spain is agriculture, and though it has never recovered the important position it held during the time the Romans held possession—and the time of the Moors—over half the population subsists by the farming, which supplies fully two-thirds of the exports. Those who till the soil live in deep poverty, often because of their own indifference to effective means of agriculture, more often because of the lack of productiveness of the soil. The mountain slopes are covered with woods; the chief varieties of trees throughout the country are the elm, poplar, beech and cork oak. A great number of fruit trees are found, and the vine flourishes on stony soil and unwatered lands. More saffron is produced in Spain than in any other country in the world, and the olive constitutes its great national wealth. Wheat, likewise, is an important product, and maize and rice are grown in the southern provinces. Esparto, oats, hemp, flax and tobacco are also found in significant quantities. The cultivation of the vine has led to extensive production of wines, and those of Malaga, Jerez (sherry) and Alicante are famous. The annual output usually consists of as much as 700,000,000 gallons.

Manufactures. The manufactures are not sufficiently developed to supply the home demand. The great industrial center has long been Catalonia, and Barcelona is the principal seat of the leather, paper, metal, lace-making and textile industries. The silk, cotton and woolen manufactures are not extensive; nor are the metal or leather industries, but every effort is made to make the iron and steel products supply the local needs. Cordova was once famous for its horsehide leather, but it no longer retains its former significance. Other manufactures include beet sugar, glass, corks and

olive oil; sardine canning, pickling of green olives and the manufacture of tobacco, jewelry, and gold and silver ware are also carried on.

TRANSPORTATION AND COMMERCE. The steamship service between Spain and the ports of other European countries is excellent, as the Spanish coasts contain over 100 harbors. The chief ports are Barcelona, Cadiz, Bilbao, Malaga, Alicante, Santander and Valencia. Regular service is maintained with the chief Atlantic and Mediterranean ports of Europe, the Philippine Islands, Cuba and New York. The railroad system is good and connects with French territory around either end of the Pyrenees. The trade is limited almost wholly to exporting raw materials and importing a large bulk of the manufactures that are consumed. Domestic trade suffers from the disadvantages attendant upon lack of natural and artificial waterways. The exports consist of wines, fruits and minerals; the imports, of lumber, textiles, foodstuffs, machinery, coal and cotton. England and France represent the chief countries with which trade is carried on.

INHABITANTS. Spain is thought to have been inhabited at one time by a race known as the Iberians. Representatives of this stock are still found in the small province near France, where dwell the people known as the Basques. They were conquered by the Celts and later by the Carthaginians, Phœnicians, Romans, Visigoths, Arabs, Vandals and Moors. The Mohammedan invasion left permanent traces in the customs, interests and language of the people. The Spanish type is of medium stature, with dark skin, hair and eyes. They possess the qualities characteristic of born adventurers, and their simplicity and intensity of feeling, which is almost childlike, has enabled them to distinguish themselves both in literature and in art. They are fundamentally a religious people, with a philosophy of life that is a close approach to stoicism. The national religion is that of the Roman Catholic Church. Only about 30,000 inhabitants represent the Protestant, Jewish and other faiths. The prevailing language is the Spanish.

GOVERNMENT. The Government of Spain is a constitutional monarchy, so declared by the constitution proclaimed June 30, 1876. The executive power is vested in a king, whose sovereignty is inviolable and irresponsible. Ministers assume responsibility for all his official acts by countersigning them, and the ministry now consists of the following departments: president of the council, minister of foreign affairs, minister of justice, minister of finance, minister of the interior, minister of war, minister of marine, minister of agriculture, commerce and public works and minister of education. There is a National Legislature, known as the Cortes, consisting of a Senate and a Chamber of Deputies. The senators are divided into three classes: those entitled to seats by their own right (the adult sons of the king and of the immediate heir to the throne, Spanish nobles, presidents of the councils of state, war, navy and Supreme Court and of the tribunal of accounts, captain-generals of the army, the admirals of the navy and the archbishops); 100 senators nominated by the Crown; and 180 senators elected by restricted suffrage to serve for a term of five years. The Chamber of Deputies consists of 431 members, chosen by popular election to serve for five years. The king summons the Parliament, and annual sessions are held. They are all public, and provisions are made that a new Cortes must be called three months after the old has been dissolved. Local government is provided for through a separation of the country into provinces and communes, over which an Ayuntamiento, or elected assembly, has power. It consists of from 5 to 39 members who serve for four years, half the membership being elected biennially. They have entire control of local government, and are not responsible to the central government, except when their measures threaten the general welfare.

The judiciary consists of a Supreme Court of Cassation convening at Madrid,

several District Courts under the jurisdiction of the Supreme Court, tribunals, justices of the peace and municipal courts.

EDUCATION. See EDUCATION, NATIONAL SYSTEMS OF.

LITERATURE. See LITERATURE, subhead *Spanish Literature.*

CHIEF CITIES. The most important cities are Madrid, the capital; Barcelona, Cadiz, Valencia, Malaga, Seville and Granada.

HISTORY. The earliest inhabitants of Spain were of Celtic and Iberian stock. Probably as early as 1100 B. C. the Phœnicians visited the country and established colonies and trading posts on the coast. Later came the Greek traders, but little is known of the country before it was conquered by the Carthaginians under the three generals, Hamilcar Barca, Hasdrubal and Hannibal (See HANNIBAL). As a result of the Second Punic War Spain fell into the power of Rome, but it was not wholly subdued until the time of Augustus. In the succeeding centuries it was thoroughly Romanized in language and customs, and the Christian religion replaced the Carthaginian idol worship. As Rome declined in power Spain suffered invasions from the barbarians. Early in the fifth century there was such an inundation of Vandals and Alans that the land had not recovered from the resulting confusion and division up to modern times. In 415 the Visigoths set up a kingdom that had some claim to stability, but it was overturned by the Arabs and Moors in 711. Charlemagne invaded the country in 778, won from the Moslems all the northeastern corner of the peninsula, and thus began the gradual expulsion of the Mohammedans which terminated in the fall of Granada in 1492.

By the tenth century the Arab civilization reached its height. There had been rapid progress in agriculture, art and sciences, and Cordova, with its university drawing thousands of students, and its stately palaces, was perhaps the greatest center of learning of its day. By the middle of the next century, the Ommeiad dynasty of the Moors, which had been in power for almost three centuries, had become extinct. In the meantime several small Christian kingdoms had grown up, starting in the mountain fastnesses of the north. By the early part of the 13th century the Moorish dominion in Spain had been seriously weakened by the united efforts of the states of Castile, Navarre and Aragon. In 1469 Isabella of Castile and Ferdinand of Aragon were married, in 1479 their states were virtually united into a single kingdom, and in 1492 these sovereigns entered Granada, the last Moorish stronghold. Ferdinand conquered the Kingdom of Navarre 20 years later, thus bringing all Spain under one rule.

The discovery of America by Columbus in 1492 opened the stored wealth of Peru and Mexico to the country, and Spain soon rose to a leading place in Europe. However, the mines were soon exhausted. The Moors and Jews were persecuted and expelled by the Christians. As they were the most industrious and enterprising people, the country suffered a severe loss and soon declined from the leading place which it had occupied in the 16th century. Charles I, grandson of Ferdinand, was also grandson of the Emperor Maximilian. He became King of Spain in 1516, and was elected Holy Roman emperor as Charles V in 1519 (See CHARLES V). During his reign Mexico and Peru were conquered, and large tracts were gained in northern Africa. He resigned in favor of his son, Philip II, in 1556. This ruler by his tyranny and fanaticism caused great losses to Spain. He had received Netherlands by inheritance from his father, but he persecuted the people so severely and ruled so arbitrarily that he drove them into a frenzied revolt whereby they finally gained their independence (See NETHERLANDS, subhead *History*). He also sent a large fleet called the Armada, against England, and the destruction of this fleet in 1588 reduced Spain from her position as a great naval power.

His son, Philip III, cruelly persecuted the Moors and finally issued a decree in 1609 requiring all of them to leave Spain under the penalty of death. Charles II died without an heir, in 1700, and the question of the succession to the throne brought on the War of the Spanish Succession, which was ended by the Treaty of Utrecht in 1713. According to its terms, Philip V, grandson of Louis XIV, became King of Spain; but Naples, Sardinia, Sicily, Milan, Gibraltar, Minorca and Spanish Netherlands were lost. The state was generally prosperous under Ferdinand VI (1746-1759) and Charles III (1759-1788), and reforms were introduced. Charles IV lost all the advantages recently gained and abdicated in favor of his son, Ferdinand VII, in 1808. Joseph Bonaparte was declared king by his brother, Napoleon, the same year, but the people rose in favor of Ferdinand and he was restored to power in 1813 by the allies of Europe.

During the wars with Napoleon the Spanish colonies in America declared their independence. Florida was sold to the United States in 1819. In 1820 a revolution led to the abolition of the Inquisition and to a more liberal constitution.

Ferdinand VII was succeeded by his daughter, Isabella II. In 1868 she was driven from the state, and in 1870 the second son of Victor Emmanuel of Italy, Amadeus, was elected king. He reigned three years, and after an unsuccessful attempt to set up a republic, Alfonso XII, son of Isabella, was made king in 1874. Alfonso's death in 1885 was felt as a great calamity, as it plunged the state into a long minority. The European powers, however, were favorable to the Queen Regent Christina and to her son, Alfonso XIII.

The Cubans rose in rebellion and were dealt with mercilessly. As a result of a war with the United States, Cuba gained her independence. Porto Rico was lost and the Philippines were ceded to the United States for $20,000,000. Alfonso XIII was crowned in 1902. He has shown a tendency to think for himself in political affairs, and the cool courage he has shown in anarchistic attacks has greatly increased his popularity. Population in 1910, 19,588,688.

Spalding, *Spawl' ding,* **John Lancaster** (1840-1916), a Roman Catholic prelate, born at Lebanon, Ky. He was educated at Mount St. Mary's College and at the American College of Louvain, Belgium, where he was ordained a priest. In 1871 he became chancellor of the Diocese of Louisville, and in 1877 Bishop of Peoria. Bishop Spalding is an extraordinary preacher. He planned ceaselessly for the Catholic University at Washington, D. C., with Archbishop Ireland founded the Catholic Colonization Society, was president of the Catholic exhibition at the World's Columbian Exposition and served on the arbitration board for the anthracite coal strike of 1902. He is the author of *Education and the Higher Life; Things of the Mind; Thoughts and Theories of Life and Education; Opportunity and Other Essays; Religion, Agnosticism and Education;* and *Socialism and Labor.*

Spaniel, *Span' yel,* a numerous breed of dogs familiar everywhere, since it includes such types as the retriever, poodle, Newfoundland, St. Bernard and setter. All are heavy-built dogs with broad heads, protruding muzzles and long, drooping ears; their hair is generally long and wavy, especially upon the tail. The brains of these dogs are larger than those of most dogs and all members of the class show a high grade of intelligence. Many of the best sporting dogs, the most affectionate pets and the noblest life-savers of the animal world are found among them. There are three main classes of the spaniels, including the brown or brown and white Cocker spaniels; the water spaniels, with silky, water-shedding coat and broad, flat feet; and the toy spaniels, having mischievous faces and playful ways.

The name spaniel is supposed to indicate that these dogs are of Spanish origin but no other record remains of their nativity. See SAINT BERNARD; NEWFOUNDLAND DOG; SETTER; POODLE.

Span'ish-Amer'ican War, the struggle between Spain and the United States in 1898. Since the close of the Civil War Spain's mismanagement of Cuba, which had been in an almost constant state of turmoil or oppression, had so aroused the United States Government that it had frequently proposed purchasing the island as a protection to American investments. Finally in February, 1895, a new rebellion, the sixth in 50 years, broke out in Cuba, and Captain-General Weyler's attempts at suppression were so cruel and ruinous that intervention by the United States was suggested. But in his message of December, 1897, President McKinley urged further patience, and the Sagasta ministry, through Captain-General Blanco, proposed home rule for Cuba.

At length the United States battleship *Maine* was sent to Havana to protect American interests. On the night of Feb. 15, 1898, it was destroyed in Havana Harbor under circumstances which seemed to indicate that various Spanish officials were in some way responsible. As a result, President McKinley recommended forcible intervention, Congress declared Cuba independent and sanctioned intervention, and from Apr. 21 war was declared to exist. The first shot of the war was fired on Apr. 23, when the United States *Nashville* captured the Spanish merchantman *Buena Ventura.* By the President's orders, portions of the Cuban coast were speedily blockaded and some 200,000 volunteers were equipped and drilled for service in the camps of instruction which were established near Tampa, Fla., and Chickamauga, Ga.

In the weeks which followed, a number of minor engagements took place along the coast of Cuba; but throughout the war only three battles of significance occurred. The first of these was at Manila Bay, May 1, where Commodore George Dewey, with his Asiatic Squadron, utterly destroyed the Spanish fleet and captured the forts on shore and at the entrance to the bay. General Merritt, with 20,000 troops, then speedily arrived, and, as the result of a land and sea attack, Aug. 13, the city of Manila fell.

The second important naval battle of the war took place in the harbor of Santiago. A second Spanish fleet, under Admiral Cervera, had meanwhile left the Cape Verde Islands for the harbor of Santiago, where the American Flying Squadron, under Sampson and Schley, blockaded them. To complete the blockade Lieutenant Hobson attempted to sink the collier *Merrimac* in the entrance to the harbor. Seventeen thousand troops, under General Shafter, were then hurried to Cuba, and Santiago was besieged by land and sea. In the certainty that the city would fall, Cervera had been ordered to dash from the harbor; but on July 3, in a desperate running fight, his entire squadron was annihilated, some 400 of his men were lost and he and 1700 prisoners were captured (See SANTIAGO, BATTLE OF).

Meantime the other important battle, and the only land engagement of moment during the war, had taken place. Having landed a little east of Santiago, with the purpose of pushing on to aid in the capture of that place, the American troops were resisted at two strongly fortified hills, San Juan and El Caney, which they carried by assault after a heavy loss, July 1 (See ROUGH RIDERS; EL CANEY, BATTLE OF). As for the siege of Santiago, further resistance was seen to be useless, and on July 15 General Toral surrendered the entire District of Santiago. The following week General Miles started out to seize the Island of Porto Rico. He had taken possession of a considerable part of it when hostilities ceased. On Aug. 12 representatives of the two nations signed a preliminary agreement or protocol, which provided that Spain relinquish all claims to Cuba and cede to the United States Porto Rico and all other Spanish West Indies, with one island of the Ladrones, that Manila be occupied by the United States until the formal treaty should be concluded, which event should occur in Paris not

later than Oct. 1, and that hostilities immediately cease. The final treaty of peace was ratified in December. Spain ceded the Philippine Islands to the United States, for which she received $20,000,000, and was granted special commercial privileges in the islands until 1909.

The war cost the lives of about 3000 American soldiers, all but 300 of whom died from disease. Investigations, however, failed to attach blame for this death rate to any officials. The expense of the struggle to the United States was $165,000,000, and it was sustained by a $50,000,000 loan, by the sale of $200,000,000 worth of three per cent bonds and by increased taxes which were cheerfully met. See UNITED STATES, subhead *History;* CUBA, THE REPUBLIC OF, subhead *History;* PORTO RICO; PHILIPPINE ISLANDS.

Spanish Arma'da, The, a great fleet which Philip II of Spain sent against England. Pope Sixtus V had bestowed England upon him, as the Catholic Church could not recognize Elizabeth's right to rule. The fleet numbered 131 large ships of war and many smaller ones, with 19,000 marines and 8000 sailors. It sailed from Lisbon May 29, 1588, and, arranged in the form of a half-moon, it came in sight of the English fleet of 80 vessels off Plymouth, in July. Lord Howard, the English commander, damaged some of the ships and took the galleon, or treasure ship. The Armada then went to Dunkirk, where it was again attacked by the English, Aug. 8. So many ships were destroyed or captured by the combined English and Dutch forces that the Spanish admiral decided to return home. His plan was to go back by sailing around the north of Great Britain, but a hurricane scattered the ships, and only about 50 ever reached Spain.

The effects of this great sea fight were not confined to Spain and England alone. The battle not only determined that England was to remain Protestant and independent, but that Protestantism was to prevail in those European countries which had already adopted the principles of the Reformation.

Spanish Succes'sion, War of the, a war by the allied powers, including England, Netherlands, Austria and other German states, and later Portugal and Savoy, against France, to prevent the alliance of France and Spain. It began in 1701 and continued until 1714. Charles II, King of Spain and the last male descendant of the Emperor Charles V, died in 1700, leaving his crown to Philip of Anjou, a grandson of Louis XIV. This meant an alliance between France and Spain, which would not only unsettle the balance of power in Europe but also enable France to become supreme in colonial possessions and power. To counteract this danger the Grand Alliance was formed against France. The main object was to remove Philip from the Spanish throne and make Archduke Charles of Austria, second son of Emperor Leopold I, king in his place. The war continued 13 years and involved all Europe. In 1711 Archduke Charles became Emperor of Austria and this changed the aspect of the question. If in addition to the throne of Austria Charles should be given that of Spain, he would virtually reestablish the empire of Charles V. The Grand Alliance was soon disorganized, and the war was ended by the treaties of Utrecht (1713) and Rastadt (1714). Philip was left on the throne of Spain, but on condition that there should never be a union of France and Spain under the same monarch. Gibraltar and Minorca were ceded to England; Milan, Naples and the Island of Sardinia and Catholic Netherlands were given to Austria; and Sicily was given to the Duke of Savoy. France was forced to cede considerable territory in the New World to England. The American phase of this war was called Queen Anne's War. Some of the noted battles of this war were Blenheim, Ramillies, Oudenarde and Malplaquet. Marlborough and Prince Eugène of Savoy were the most noted generals of the allies. See MARLBOROUGH, JOHN CHURCHILL; EUGÈNE, FRANÇOIS.

Sparks, Jared (1789-1866), American educator and author, born at Willington, Conn., and graduated from Harvard College in 1815. From 1817 to 1819 he was tutor in mathematics and natural philosophy in that institution, and at the same time was studying theology and editing the *North American Review.* From 1819 to 1823 he was pastor of the Unitarian Church in Baltimore, Md. During the last two years of this pastorate he edited the *Unitarian Miscellany* and *Christian Monitor,* and from 1824 to 1831 again edited the *North American Review.* In 1839 he became professor of history in Harvard College and from 1849 to 1853 was president of that institution. During his administration important reforms were instituted. He insisted upon the charter rights of the institution and vigorously opposed the elective system. Sparks is perhaps best known, however, as a biographer, editor and collector of important documents relating to American history. Among his publications are *The Life and Writings of Washington* and *The Works of Benjamin Franklin, with a Life of the Author.*

Spar'row, the name of a group of birds belonging to the Finch Family. The English sparrow, or house sparrow, is the most common and widely distributed species. It is about six and one-half inches long. Its general color is grayish-brown, streaked with black; its sides and neck are white, and the wings, brown, with a white bar. The nest is built in almost any convenient place, such as crevices of buildings, the top of electric lights or trees. It is constructed of straw and rubbish and presents an unsightly appearance. The eggs, four to seven in number, are grayish-white, speckled with brown. Several broods are raised in a season.

This sparrow is a natural inhabitant of Europe, Asia and northern Africa. In 1850 and again in 1852 specimens were introduced into the United States by Nicholas Pike of Brooklyn, N. Y., for the purpose of destroying the army worm and other injurious insects. It rapidly spread through the cities and towns of the United States and southern Canada, and at the present time it is found in all of the states excepting the desert regions of the southwest. It has likewise been introduced into New Zealand, the Hawaiian Islands and Australia. It may justly be considered a pest, not only driving away the native birds which are beneficial, but actually destroying fruit and grain in many sections of the country. Its value as a destroyer of noxious insects is practically nothing. By reason of its prolific breeding, raising four to six broods a year, and its protection by the kind-hearted housewife, it is not probable that the sparrow will be greatly reduced in numbers.

SPARROW HAWK

Several other species of sparrow are known in the United States, though some of them are quite rare. These species include the fox sparrow, the chipping sparrow, the white-throated sparrow and the lark sparrow, or lark finch, one of the sweetest songsters found in the western part of the United States.

Sparrow Hawk, a bird of the Hawk and Eagle Family. The sparrow hawk is larger than a robin, being about ten inches long. It may be known by its bluish-gray or slate-colored head and wings; the rusty-brown back, frequently spotted with black; its rusty-brown tail with a black band; its white and rusty-brown under parts with black spots; and the two black stripes on the cheek. The female is distinguished by dusky bars on the back, wings and tail. The nest is made in holes in trees, and two to five eggs, spotted with dark brown, are laid. The sparrow hawk is an inhabitant of meadows and open woods. It ranges throughout North America east of the Rocky Mountains.

Spar'ta, one of the leading states of ancient Greece, situated in the southern part of the Peloponnesus. The Dorians invaded the Peloponnesus about 1000 B. C. and founded Sparta among many other petty states. At first her territory was only a few square miles and she had no seacoast. About 900 B. C. Sparta adopted a peculiar constitution which led to her superiority among the other states. The Spartans said that they received the constitution from an ancient lawgiver, Lycurgus (See Lycurgus). Before 700 B. C. Laconia was conquered, and Messenia fell before 650 B. C., while all the other states of the Peloponnesus except Argos had become allies of Sparta.

Government. The royal power was weakened by being shared by two kings. The Senate was composed of 28 elders and the two kings. A popular assembly of all free Spartans chose officers and decided matters laid before it. The Senate decided what these matters should be. About 725 B. C. five officers elected by the Senate and called ephors were the chief rulers. The kings now became mere priests, generals and senators. The Spartans were aristocratic in sentiment and the ephors were the servants of the Senate, which had the chief power in government.

Classes of Society. In Laconia there were three classes: Spartans, Perioeci and Helots. The Spartans were masters living among subjects eight or nine times as numerous as themselves. There were about 9000 men with their families living under arms as in a vast camp. They did no work, but each had a plot of ground which was tilled by Helots.

The Perioeci lived in subject towns of the Spartans. They ruled their own towns under the oversight of a Spartan ruler, or harmost. They owned their own land and carried on the little trade and commerce there was in Laconia. The ephors could sentence them to death without trial, although they furnished a large number of heavily armed soldiers for the Spartan army. They were from three to four times as numerous as the Spartans.

The Helots were State slaves and were from four to five times as numerous as their lords. They were used as light-armed troops in war, but were considered a menace to the State and were often put to death. Any Spartan could kill a Helot.

Social Institutions. The main principle of the Spartan system was that the individual was nothing and the State was everything. Thus at birth the State decided whether a child should be reared or not. At seven the boy was taken from his mother's roof and trained with other boys by public officers until the age of 20. This training consisted chiefly in exercises which gave the youth a strong, supple body. He was also taught to read. From 20 to 30 he lived in barracks like a soldier. At 30 he was required to marry, though he still had to take his meals in barracks and to live there most of the time. The Spartans cultivated a pithy brevity of speech, and their plain living and freedom from

trade made them seem above the weaknesses of other nations. Their women kept a larger degree of the old Homeric freedom than did the women of other Greek states.

HISTORY. Sparta was the dominant state in the early period of Greek history. We find her aid invoked in the general rising of the Eastern powers against Cyrus the Great. Athens, however, became her rival after the Battle of Marathon (See ATHENS, subhead, *Persian Wars*), and during the Age of Pericles she supplanted Sparta as leader of the Greek states (See ATHENS, subhead *Age of Pericles*). This supremacy was lost, however, after the Peloponnesian War (See ATHENS, subhead *Peloponnesian War*), and Sparta was again mistress of Greece for over 30 years.

When Sparta became involved in a war with Persia in 396 B. C., the Greek states formed a league against her. At Cnidus, in 394 B. C., the Athenian general Conon destroyed her fleet, and her power over the Ægean was lost. In 387 B. C., by the Peace of Antalcidas she abandoned the Asiatic Greeks to the Persians. At last her troops were routed by the Thebans under Epaminondas at the Battle of Leuctra in 371 B. C., and Spartan supremacy passed forever. After this time her history merges in the general history of Greece.

Spar'tacus, a Roman gladiator, leader of the revolt of the slaves, 73 to 71 B. C. Previous to this he had been forced to serve in the Roman army. He finally deserted and became the leader of a band of robbers. He was captured and placed in the gladiatorial school at Capua, where there were over 200 slaves. Under his leadership they effected their escape and joined the disaffected slaves and peasantry in the neighborhood. In a short time Spartacus found himself at the head of a good-sized army. He defeated two armies sent against him and began a march on Rome, but was defeated by Crassus and died in the battle.

Spar'tanburg, S. C., a city and the county seat of Spartanburg Co., 93 m. n.w. of Columbia, on the Southern, the Atlantic Coast Line, the Glenn Springs, the Carolina, Clinchfield & Ohio and other railroads. It has interurban electric railway service, which connects it with towns in the vicinity. Spartanburg is a thriving city, in the midst of a rich cotton-growing section, in which a large number of cotton mills are operated, and its output of cotton products is extensive. Situated about 25 m. southeast of the Blue Ridge Mountains, the town has considerable mineral wealth, and gold, limestone and granite are found in valuable quantities. A large wholesale trade is carried on and there are various industrial activities. In addition to the numerous cotton mills there are, in and near the city, lumber mills, ironworks and manufactories of brooms, soap and other articles. Spartanburg is the seat of Wofford College (Methodist Episcopal, South), founded in 1850, and of Converse College (nonsectarian), for women, founded in 1889. The Kennedy Public Library is worthy of note. A musical festival, under the auspices of the Converse College Choral Society, is held here annually. At Cedar Spring, four miles south of the city, is located the state institution for the education of the deaf, dumb and blind. Spartanburg was founded in 1787. In 1880 the first cotton mill was erected and the place chartered; since this time it has grown rapidly. Population in 1920, 22,638.

Spav'in, a disease of the hock of horses generally caused by an injury, a sprain or undue exertion. In young or overworked horses the hock joint becomes enlarged through the secretion of a large amount of a dark-colored joint oil. In all but the most serious cases hot applications, rubbing, rest and a careful diet should prove sufficient cure; in the most persistent cases blistering is necessary. Bone spavin is the more common form. This is the formation of a bony enlargement generally between the bones of the hock. Its presence causes soreness, heat and lameness at first, but in later stages these symptoms disappear and permanent stiffness is apt to result. Cold applications are effective

in the earlier stages of the disease; later hot fomentations should be used for several days, after which iodide of mercury or fly blister may be applied. After such treatment a rest of at least three months should follow.

Spawn, the egg masses, whether mature or immature, of such Batrachians as frogs and toads, or of such aquatic animals as fish, Mollusks and Crustaceans. During the spawning season Batrachians generally seek the water to deposit their eggs; fresh-water fish often go to the sea and marine fish ascend coastal streams. Many Crustaceans and Mollusks go to the deep sea. In general, among water-dwelling animals the eggs are deposited and the fertilizing milt then poured over them. It is this method of reproduction which has made easy the artificial propagation of fish and Mollusks in the hatcheries. See FISH HATCHERY.

Speak'er, the title of the presiding officer of certain deliberative assemblies, especially the British House of Commons, the House of Representatives in Congress and the lower branch of the various state Legislatures. In America the speaker is chosen from the membership of the body over which he presides. The speaker of the United States House of Representatives ranks third in dignity, in governmental circles, only the president and vice-president being above him, but in actual power he is next to the president. Previous to the year 1910 the speaker had the power of appointing all committees and was chairman of the committee on rules, but in that year, by an alliance between the "Insurgent" Republicans and Democrats, an important change was made in the House organization. The committee on rules is now elected by the House and the speaker is not a member of that committee. The speaker has the right to vote, and by calling a member to preside may engage in debate. He is chosen at the beginning of each Congress and is eligible to reelection as long as his party can keep him in power. His salary is $12,000 a year. The title is derived from the title of the presiding officer of the House of Commons.

Speak'ing Trump'et, a device employed for transmitting the sound of the voice to a distance. It is generally a hollow piece of metal or cardboard of conical form, open at both ends and provided at its small end with a mouthpiece. Formerly, speaking trumpets were employed by firemen. A cheap form made of cardboard and sometimes four feet long is frequently employed at races to announce winners, and is called a megaphone.

Specie, *Spe' shy,* **Payments, Resump'tion of,** the term applied to the steps taken between 1875 and 1879 for redeeming in coin the United States notes issued during the Civil War. As early as 1866 Congress began to take steps for the return to specie payments, but during the financial panic of 1873 the volume of notes was increased, and in 1874 the issue had reached $382,000,000. In 1875 a law was enacted providing for the redemption of all notes presented on Jan. 1, 1879, and for the gradual accumulation in the treasury of gold for this purpose. As the supply of gold increased, the value of the notes increased, and before the date specified in the law, they were at par, that is, a dollar bill was worth a dollar in gold. When this occurred, resumption was practically effected. The change wrought hardships to a large number who were owing for debts incurred when prices were high; while the face of the debt was not diminished, the value of the money in which it must be paid was nearly doubled, and prices of all commodities were correspondingly lower. These conditions brought about many failures.

Species, *Spe' sheez.* See BOTANY, subhead *Classification.*

Specific, *Spe sif' ik,* Grav'ity. See GRAVITY, SPECIFIC.

Specific Heat. See CALORIMETRY.

Spectacles, *Spek' ta k'lz,* instruments devised for aiding the sight. The first spectacles were made in the 13th century and were said to be crude and very clumsy, and there were no great improve-

ments until 600 years later, though the principles of refraction upon which the lenses are ground were known. Spectacles are worn for strengthening the sight, for remedying any defect in the vision, or for protecting the eye from too strong light. The glasses, or lenses, should be made of clear glass or rock-crystal glass, called pebbles, carefully ground and fitted to the vision of each eye. For nearsightedness, or short sight, the lens is ground concave; for farsightedness they are ground convex. It is very injurious to wear spectacles unsuited to the eye; they should be selected by an oculist who makes a prescription for the kind of lens which the optician should make and fit. See EYE; LENS.

Spectator, *Spek ta' ter,* **Papers.** See ADDISON, JOSEPH.

Spectrometer, *Spek trom' e ter.* See SPECTROSCOPE, subhead *Spectrometer.*

Spectroscope, *Spek' tro skope,* an instrument for producing and viewing a pure spectrum of a light source.

The essential parts of a prism spectroscope, as shown in Figure 1, are: (1) the collimator, which consists of a tube containing a converging achromatic lens, L, at the end nearest the prism, and a slit, S, at the other end, which is adjusted to be at the principal focus of the

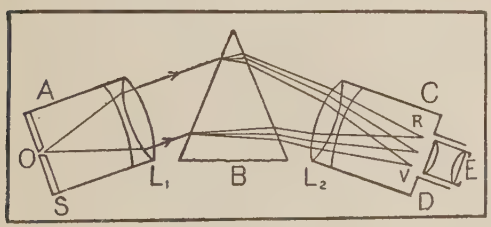


FIGURE 1

lens; (2) the prism; (3) the viewing telescope with its objective, L_2 nearest the prism, and focused for parallel rays. The light to be examined is admitted to the narrow slit, S, of the collimator, passes through the collimator lens, is refracted on passing through the prism and then enters the telescope and is focused as a real image in front of the eyepiece, E. This image is viewed through the eyepiece, which magnifies it like a simple microscope; or a photographic plate may be put where the real image is formed and the spectrum photographed, as is done in many large spectroscopes.

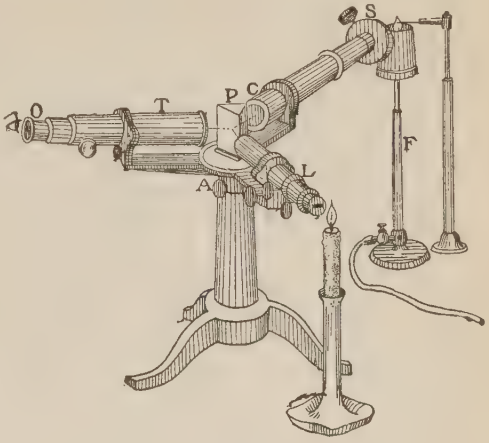


FIGURE 2

The spectrum, extending from R to V, consists of a very great number of images of the slit, S, side by side, an image being formed by light of each wave-length or color in the source. If the source emits light of all wave-lengths, the spectrum is continuous; if it emits light of but a few definite wave-lengths, the spectrum consists of a few bright images of the slit, showing as a bright line for each wave-length; and in the case of the solar spectrum, the dark Fraunhofer lines show in the spectrum because there are no images of the slit (or very faint ones) formed corresponding to these particular wave-lengths. The narrower the slit, the narrower and sharper are the images of the slit, and hence the better is the instrument for the study of spectra showing these fine lines. Figure 2 shows the mounted instrument.

SPECTROMETER. When a spectroscope is supplied with a circle graduated to degrees and minutes, or with some other device for measuring the deviation of the light on passing through the prism, it is called a spectrometer, the spectroscope being arranged merely for viewing

or photographing the spectra and not for measuring the deviations for the different colors.

See LIGHT, subhead *Refraction of Light;* COLOR, THEORY OF.

Spectrum, *Spek' trum.* See COLOR, THEORY OF, subhead *Spectrum;* LIGHT, subhead *Prism.*

Spectrum Anal'ysis, the study of spectra in relation to the nature of the sources of light from which the spectra are formed. For this purpose, spectra may be divided into three general classes: continuous, bright line, absorption.

A *continuous spectrum* contains light of all wave-lengths and appears as a continuous band of color shading from deep red at one end to violet at the other. The light from white-hot solids and liquids gives rise to continuous spectra, and the hotter the solid the brighter the spectrum toward the violet end.

A *bright-line spectrum* contains light of only a few definite wave-lengths and appears as a greater or less number of isolated bright lines separated by relatively broad, dark spaces. The bright lines may be all fairly close together and of nearly the same color, or they may be widely distributed and be of various colors from red to violet. Gases and vapors, when rendered incandescent by heat or by the passage of an electric discharge, as in a Geissler tube, yield bright-line spectra. A bit of common salt burned in a colorless gas flame makes the flame yellow, and the spectrum from this flame consists of a bright yellow line and a few very faint lines of other colors. Every known substance, when vaporized and rendered incandescent, yields a bright-line spectrum, the number and relative brightness of the lines depending somewhat on the manner of rendering the substance luminous. The investigation of substances yielding in their spectra bright lines that could not be attributed to any elements already known has led to the discovery of several new elements. The identification of substances by means of their bright-line spectra is a very delicate test and constitutes a large part of *spectrum analysis.*

An *absorption spectrum* is obtained when the light from some source that would yield a continuous spectrum is made to pass through some absorbing medium before entering the spectroscope and forming a spectrum. Spectra due to absorption by solids or liquids generally show broad absorption bands shading off at both sides, leaving portions of the continuous spectrum. Ruby glass, for example, absorbs nearly all the colors except red and a very little violet; hence its absorption band extends from the reddish-orange nearly to the extreme violet. Absorption by gases and vapors, on the other hand, gives rise to sharply defined dark lines in the spectrum, showing that light of only a few definite wave-lengths has been absorbed. The spectrum formed by sunlight is an absorption spectrum, the dark lines being due to absorption by vapors surrounding the sun, and a few of them to absorption by our own atmosphere.

In the above discussion, it has been assumed that the spectrum extends from the deep red at one end to the violet at the other. But this is only the visible portion of the spectrum. It is possible by means of photography to study the spectrum of a substance far beyond the visible violet, and this portion of the complete spectrum is called the *ultra-violet spectrum.* It is also possible by means of the thermopile or other device to study the spectrum of a substance far below the red end of the visible spectrum, and this part of the spectrum is called the *infra-red spectrum.* A complete study of the spectrum of a light source must include a study of all parts of its spectrum, the visible, the ultra-violet and the infra-red. The complete spectrum of a source of light is usually many times more extended than that part to which the average eye is sensitive and which is called the visible spectrum.

FRAUNHOFER LINES. When the metallic vapors that surround the sun absorb light of certain wave-lengths, they cause dark lines in the solar spectrum. These vapors absorb from the light emitted by the main body of the sun,

light of the same wave-lengths that they themselves would emit. For example, the glowing vapor of metallic sodium emits a bright yellow light; the vapors of metallic sodium enveloping the sun absorb from the light emitted by the hotter interior of the sun just this particular yellow light, thus leaving a relatively dark strip or line in the solar spectrum. They are called Fraunhofer lines, after the German physicist Fraunhofer, who first studied them systematically in 1814. He observed and counted 500 to 600 dark lines, the most prominent of which he designated by the letters "A" to "H," going from the red to the blue of the spectrum. The "D" line is the one caused by the vapor of sodium and referred to above. These designations are still used. The importance of Fraunhofer's work is very great, as it was a fundamental step in the development of modern spectroscopic study, which has contributed so greatly to the advancement of various sciences, and especially modern astronomy.

Speculum, *Spek' u lum,* **Metal,** an alloy employed in making the metallic mirrors of reflecting telescopes. It consists of two parts of copper and one part of tin, to which is added a small amount of arsenic to increase the whiteness of the metal. See TELESCOPE.

Speech. See VOICE.

Speed'well, a class of well-known herbs of the Figwort Family, beginning to be common in dooryards and by roadsides as well as in dry meadows. The commonest speedwell has slender, furry stems growing along the ground for several inches, but finally raising themselves erect to bear a short, loosely-set spike of lavender blossoms. The leaves are opposite on the stem and have small wavy-edged blades which are sometimes long-stemmed and sometimes stemless. Like all figworts, the speedwell has an irregular, four-petaled flower whose lower petal is smaller and generally paler than the rest. This plant is in bloom from June until August in nearly all states east of the Mississippi. A smaller species of speedwell, having narrower, more rounding leaves and flowers in shorter clusters, is found on mountainsides both in the East and in the Rockies.

Spell'ing, the practical use of an alphabet whereby words are represented by combining alphabetic symbols. If all alphabets had but one symbol for each definite speech-sound and but one speech-sound represented by a given symbol, spelling would be determined by pronunciation, that is, would be phonetic. While in certain languages there is a close approach to such a condition, in modern living languages we find more or less faulty spelling from the point of view of phonetics. English spelling presents an extreme form of phonetic corruption. The earliest English (Anglo-Saxon) writers used an almost purely phonetic spelling, but, as the language gradually developed, irregularities crept in, old sounds were altered and new ones were introduced, and under the influence of the Norman-French, English was practically respelled. When printing was introduced the existing forms became more or less fixed, and today we use what is essentially Elizabethan spelling, regardless of the fact that pronunciation has materially changed.

English spelling has also suffered from the ignorance of those who, during the revival of learning, sought to make words of classical origin, many of which were introduced at this time, conform in spelling as exactly as possible to the words from which they were derived. One example of the many etymological blunders of this nature is the *s* in *island,* which was inserted to show the derivation from the Latin *insula* and the connection with the English *isle.* In origin it is related to neither of these. English spelling, however, has still a considerable phonetic element, and is not entirely lacking in system. Its principal defects, from a practical viewpoint, are ambiguities in the use of *c* and *k, c* and *s, f* and *ph, t* and *d* or *ed, ch* and *k,* and the use of silent letters. See ALPHABET.

SPELLING REFORM. While the development of English spelling practically ended with the 16th century, there are

over 3000 words whose orthography is unsettled, and modifications are continually taking place. In recent years there has been a determined movement to simplify the spelling of English words. In 1906 the Simplified Spelling Board, with Prof. Brander Matthews of Columbia University as chairman, was organized. Among the 300 words which it proposed to simplify were *addresst* for *addressed, center* for *centre, cigaret* for *cigarette, humor* for *humour.* President Roosevelt ordered the public printer to adopt the spelling advocated, but later modified the order, so that it applied only to the official correspondence of the White House. The extreme advocates of simplified spelling have made but little headway thus far, but a medium ground is taken by many editors. *Webster's New International Dictionary,* for instance, recognizes the advantages of the simpler spelling of many words, and gives the simpler form the preference when facts seem to justify that course.

Spel'ter. See ZINC.

Spen'cer, Herbert (1820-1903), an English philosopher, born at Derby, England. His father, William George Spencer, was a schoolmaster in Derby, and a man of ability and learning. He wrote a work on geometry preparatory to the study of Euclid which is recognized as valuable. He was also a careful and thoughtful observer of nature. Thus Herbert's early surroundings fostered his natural love for insects, moths, butterflies and flowers, which he studied and collected while still young.

When he was about 13 years of age he went to live and study with his uncle, Rev. Thomas Spencer. While there he became sufficiently proficient in mathematics to assist his father in his school at Derby. He did not find teaching very congenial, and at the age of 17 years he became a railroad civil engineer, assisting in the surveying of different lines, in the meantime writing articles for the *Civil Engineers' and Architects' Journal.* In 1842 certain articles that he wrote on *The Proper Sphere of Government* appeared in *The Nonconformist;* and their success encouraged him to further literary work. He abandoned his career of civil engineer and went to London. Here for some time he wrote leaders and articles for the *Economist,* becoming subeditor of this paper in 1848; and he continued in that position for five years. This was an important period in Spencer's life. While here he met George Eliot, John Stuart Mill and other people of note, and published his *Social Statics.* Spencer wrote this book with his own hand; all his later works were dictated. He allowed this work to go out of print, as his maturer views did not wholly approve it. It was revised and parts of it published in other form.

A short essay which Spencer wrote in 1852 reveals the tendency of his mind regarding the theory of evolution which became the central doctrine around which his philosophy was to be built up. He says: "Which, then, is the most natural hypothesis, that of special creations which has neither a fact to support it nor is even definitely conceivable; or that of modification which is not only definitely conceivable but is countenanced by the habitudes of every existing organism?"

In 1860 Spencer issued a prospectus of a system of philosophy which he announced that he would publish in periodical parts; that he had been preparing it for several years, and it would fill ten volumes. This was certainly a daring announcement to publish; but he made good his promise, overcoming the difficulties of such a stupendous task as even he could not have fully foreseen, and doing this while suffering from ill health.

In 1862 the *First Principles* appeared. The first part of this book deals with *The Unknowable.* In it he declares the certainty of an incrutable Power which transcends human knowledge. He says of this conclusion that, while satisfying the most rigorous logic, it gives to religion the widest possible sphere of action. In the second part of the *First Principles* he deals with *The Knowable,* treating of Space, Time, Matter, Motion and Force.

This work has had a wide influence. In this and his subsequent works, *Principles of Psychology, Principles of Sociology, Principles of Ethics,* and numerous other writings, Spencer shows a particular and definite knowledge of all the sciences that has passed unchallenged by the specialists in each branch. This is remarkable; especially in an age of highly specialized and minute scientific investigation. The man himself furnishes a profoundly interesting study in psychology. The results that he attained have been accounted for by "the absolute perfection of his logic." If the statement is, perhaps, too strong, yet it was probably this correct and fearless logic combined with his extensive knowledge that made his work possible. He drew from innumerable sources of knowledge, and his well-regulated and accurate mind seems to have seen at once the bearing and connection of each item of knowledge in the great structure of human philosophy.

Spencer was never married, but not for misanthropic reasons. His work in sociology shows his desire for better human conditions; but he did not recognize the claim of religion to reveal the "unknowable," and so has been seriously criticized as having done, in this particular, a serious injury to the race whose conditions he wished to improve. His system is the most comprehensive and inclusive statement of the evolutionary philosophy that has appeared, and has exercised a wide-reaching influence.

Spencer, Joseph William Winthrop (1851-), a celebrated geologist, born in Ontario and educated at McGill, Göttingen and King's College universities. He was successively science master at Hamilton College Institute, professor of chemistry and geology at King's College University, professor of geology at Missouri University and state geologist of Georgia. Recently he has been conducting geological investigations in the West Indies and Central America. Dr. Spencer was associated with Dr. Robert Bell in the Canadian geological survey, has restored the outlines of the drowned Laurentian River and its tributaries, has discovered most of the changing conditions of the Niagara River, and has made the first computation of the age of Niagara Falls and of the rate of rise of the crust of the earth in the lake regions.

Spencer Gulf, a large gulf on the southern coast of Australia. It is 200 m. long and 90 m. broad, narrowing to 3 m. at its upper extremity. Port Augusta is at the head of the gulf.

Spen'ser, Edmund (about 1552-1599), an English poet, born in London. His childhood was spent in humble circumstances. He went as sizar, or poor scholar, to Cambridge, where he received the degree of M. A. in 1576, and two years later he removed to London, living with the Earl of Leicester. In 1580 he accepted the position as secretary to Lord Grey, the lord deputy of Ireland, and joined the group who attempted to subdue Desmond's Rebellion in that country. He was soon established in Kilcolman Castle, in Cork County, where he lived until 1598, when his home was sacked and burned by Irish rebels. He went to England, and fortunately the ugly supposition that he perished for want of bread has not been verified; ruined and grief-stricken, he died, and was buried near Chaucer in Westminster Abbey.

Spenser began to publish in 1579, when his poem, *The Shepheardes Calendar,* dedicated to Sir Philip Sidney, appeared. At Leicester House he began *The Faerie Queene.* Urged by Sir Walter Raleigh, he published the first three books of it in 1590. Three more appeared six years later. *The Shepheardes Calendar* is interesting less in itself than as a foreshadowing of the poet's powers. Still, it strikes a highly individual note and has a freshness and charm that won the praise of his contemporaries. In *The Faerie Queene* he is the dreamer dwelling on by-gone days; his imagination revels in the realms of beauty, and the poem becomes a profound allegory of human life. Singing nobly of the goodness and beauty in the world, he revealed through the magical melody of

his verse the imperishable and insistent charm of beauty itself, and by reason of the splendid heights to which he rose, has rank as one of the most poetical of all English poets. He made use of the nine-line stanza, known as the Spenserian, which was a general favorite again among the poets of the Romantic School. Among his other works are *Colin Clout's Come Home Again,* his marriage ode, the *Epithalamion* (the finest nuptial hymn in the English language), *Prothalamion, The Tears of the Muses, Mother Hubbard's Tale, Astrophel* and *The Present State of Ireland.*

Spense'rian Stan'za, the stanza used by Edmund Spenser in *The Faerie Queene.* This stanza consists of a strophe of eight ten-syllable lines and one twelve-syllable line. The rhyme scheme is threefold; the first and third lines form one rhyme; the second, fourth, fifth and seventh, another; and the sixth, eighth and ninth, the third. Byron used this measure in his *Childe Harold.*

Spermaceti, *Spur" ma se' ty,* a fatty, waxy material produced from the oil found in the cavities of the head of the sperm whale. Sperm oil is obtained from spermaceti by washing it in hot water and weak boiling lye and then allowing the oil to drain out. The solid remaining is a white substance resembling wax. It is tasteless and has only a slight odor. It is used in the manufacture of candles and ointments. Sperm oil was formerly used for a fuel in lamps. See SPERM WHALE.

Sperm Whale, a large whale of the warmer oceans, which is valued especially for the sperm, or spermaceti, contained in a bony box, called the case, found in its head; the sperm is also produced to some extent in parts of its back. This spermaceti is widely used in the manufacture of candles, pastes and ointments. The sperm whale often attains a length of 60 ft. and, unlike most whales, has a wide throat. Its lower jaw has large, pointed teeth, but the upper jaw is without teeth or whalebone. A waxy secretion, called ambergris, produced by a diseased condition of the intestines of the sperm whale, is often found floating in large quantities in regions inhabited by this whale. It is of use in the manufacture of perfumery. The oil obtained from the sperm whale is much purer than common whale oil. It was formerly highly prized for burning in lamps. See AMBERGRIS; WHALE.

Sphagnum, *Sfag' num,* a name given to a certain group of bog mosses, growing in swampy places where they form a thick carpet. The stems branch only upon one side and the new shoots grow to the same size as the parent stem, thus giving an appearance of a much-divided limb. The new shoots, however, frequently break off to form new plants. The underground stems or roots are several yards long and extend deep into the peat bogs formed by dead roots and stems of former plants. Sphagnum is one of the longest-lived of plants. It is used by florists as part of the soil for rooting plants and is elsewhere used for packing. Its chief value, however, is probably the production of peat. See PEAT.

Sphinx, *Sfinx,* a fabulous monster in the mythology of both Greeks and Egyptians. The Grecian Sphinx had the body of a lion, the wings of a bird, with a woman's head and breast. It had been sent to the Thebans in punishment from Juno, and from its crouching position on a wayside rock, it proposed to all travelers a riddle. Those failing in its solution were devoured. To this conundrum, What animal goes on four legs in the morning, on two at noon and on three in the evening? Œdipus gave the successful answer of man, who as an infant, walks on hands and feet; in the prime of life, erect; and in old age, with the aid of a staff. Mortified because her riddle was solved, the Sphinx killed herself. The sphinx-form was much used by the Greeks in artistic and decorative schemes.

The Egyptian Sphinx, a human head on a lion's body, was represented as lying with front paws stretched forward. The largest of these, near the second Pyra-

mid at Gizeh, is 125 ft. long and 63 ft. high. Excepting the masonry forepaws, the body is solid rock. The Egyptians had also sphinx figures with the heads of rams and of hawks. No connection is traceable between the Greek fable and the Sphinx of the Egyptians, which was probably a symbolism of their religion, and so-called because of its chance resemblance to the Greek figure of that name.

Sphinx Moth, a large hawk moth, which derives its name from the habit of its larvæ of sitting with the head and fore part of the body raised in an attitude somewhat resembling the Egyptian sphinx. See HAWK MOTH.

Sphygmograph, *Sfig' mo graf,* a device employed for measuring and recording the flow of the blood in an artery. It is usually arranged over the pulse, and by means of a series of very minute levers the frequency of the pulse beat is indicated and recorded, together with its measurement of force, all on a moving surface of paper set in motion by clockwork. By computations based on these records, the quantity of blood flowing through an artery in a given time can be determined. See ARTERIES; CIRCULATION.

Spices, *Spi' cez,* certain vegetable substances, such as seeds, bark, roots and fruits, having an aromatic or pungent odor and agreeable to the taste, used in flavoring food. They are produced chiefly in tropical countries and are brought principally from the Old World, especially the East, where the trade in them has always been large and important. Among those spices most used are pepper, both black and red, mace, nutmeg, cloves, cinnamon, allspice, ginger, mint and mustard. Spices contain certain volatile oils which affect the digestive organs and stimulate the nervous system, and may be said sometimes to aid digestion, but they are not of any food value. See PEPPER; MACE; NUTMEG; CLOVE; CINNAMON; ALLSPICE; GINGER; MUSTARD.

Spi'der, a class of Arachnida found in all parts of the world and represented by many different species. Most of the members of this class are looked upon with fear or with superstitious regard, probably because their sly, insidious ways are easily watched and are generally well known. To the person who studies the ways of the spiders, however, their habits show much that is of interest and their labors are found to be carried on with skill.

The spiders as a class were once grouped with the Insecta but have more recently been placed in a class by themselves, owing to several structural differences. The bodies have but two main divisions, a cephalothorax, which is a union of the head and the thorax, and an abdomen (See INSECTA). The cephalothorax is protected by a covering of scaly hairs and bears eight pairs of eyes; this number may be diminished to six pairs or to four, but even so the spider may feel well prepared to watch for his enemy or his prey. Upon the sides of the cephalothorax are slits which open into the book lungs, thin tissues arranged much like the leaves of a book, so that the air comes in close contact with the blood that circulates through them. The cephalothorax and the abdomen of the spiders are connected by a thin, flexible stalk whose slenderness is emphasized by the almost globular form of the abdomen. Some species, however, differ from this general form and have a segmented or a more flattened abdomen and an inconspicuous connecting stalk.

There are three classes of appendages, known respectively by the scientific names of cheliceræ, pedipalpi and ambulatories. The first, the cheliceræ, are two-jointed nippers, which may be likened to the long pincers of the lobster; between these appendages is hidden the tiny mouth which, since the spider takes chiefly liquid food, is only a little slit nearly covered by a sucking lip. The pedipalpi are organs which aid in the seizing and crushing of the prey, and the ambulatories are the organs of locomotion. Of the latter there are four pairs, all of which are seven-

jointed. The first pair points forward, the second, forward or laterally, and the third and fourth pairs, backward; thus the spider moves forward or backward with equal ease. Occasionally a species is found in which the legs are all placed laterally but these are not the most common species. The appendages are all more or less hairy, and the legs are terminated by tiny claws.

Probably the greatest interest in the spider is due to its ability to spin so quickly and so skillfully a web which in design and texture cannot but command the admiration of the beholder. The silk for the web is spun from tiny protuberances, called spinnerets, which lie at the posterior part of the abdomen and underneath. From the openings in these the silk exudes in sticky secretions that stiffen in contact with the air; the separate strands are then twisted together in a many-fibered thread. By measurement a single spider has been known to spin over 300 yards of the silk almost without rest. The method of laying the web differs with the species of spider and the kind of web that is to be built. The most frequently seen web is probably the circular web of the common garden spider. To make this the spider first spins a long, silken thread which is swung by the wind to the point of support. When firmly caught at both ends the spider carefully draws up the slack until the thread is perfectly taut. From this it drops other lines which are to act as the supports, and then fills in the circle of the web. Other spiders build tunnel-like webs that lead to their nests, and still others, which dig their tunnels in the ground, line their nests with softest silk. The claws on the hind feet have teeth resembling those of an ordinary comb, and it is supposed that by means of these the spider holds itself in position on the web. Fabre says, however, that these claws are for making the thread, and that the spider oils its feet to keep it from sticking to the web.

Spiders develop from eggs which are left by the mother in a silken cocoon. Upon hatching, the tiny spiders, which at first may remain huddled together for the purpose of warmth, soon separate, each to find a place of vantage upon some wall from which, by means of a streamer of silk raised into the air, it may float to a spot where it can make a web of its own. Probably the most favorable place for a web is in the grasses beside a path where the insects, frightened by the approach of the traveler, fly or leap into the snare that the spider has set.

Certain points in the structure of the spider have led naturalists to believe that it was once an aquatic animal, and there is one species, the water spider, which still makes its home in the stream. It is not, however, really aquatic, for, although it lives in water, it breathes by lungs and not by gills; the way that it accomplishes this is decidedly novel. Its nest is a conelike bit of silken masonry located probably on the sandy bottom of a clear brook. The spider comes to the surface of the water, fills with air the hairy space about its legs and then sinks to its nest, where the air is released into the anchored retreat. Again and again the spider comes to the surface and sinks to the nest until the cone is filled with pure air; then within the well-ventilated cell it remains, caring for its family and providing it with food, which consists of the tiny water bugs that are plentiful at its very door. When the air becomes foul it is renewed by a repetition of the process of ascending to the surface for a new supply.

Spiders differ greatly in size, habits and color. Those seen in temperate zones are chiefly of sober colors, although red and black, yellow and black, striped and spotted ones are frequently found. The tropical spiders are larger and are sometimes poisonous; the bite of any spider is painful but is not as liable to be fatal as was once supposed. Ordinarily spiders are solitary animals, each occupying a web of its own and jealous of any intrusion; occasionally colonies are found, but not among the adults of the ordinary species of temperate zones. In securing its prey the

spider shows great circumspection and cunning. It allows the unhappy insect to entangle itself as much as possible in the silken snare of the web, and rarely approaches unless there are signs that the web is weak or that the insect is apt to break from it by struggling. In such cases the spider will run quickly and cautiously up to where it may draw the victim closer into the web or disable it with a clutch from the stout little pinching claws. After sucking the blood from the body, the dry and useless remains are pushed from the nest, and any breaks in the web are repaired before the skillful trap-builder retires to its point of vantage to watch for its next victim.

The daddy-longlegs, frequently said to be a spider, belongs to a separate but closely allied class. See TRAPDOOR SPIDER; TARANTULA; DADDY LONGLEGS. Consult J. H. Fabre, *The Life of the Spider.*

Spikenard, *Spike' nard,* or **Vale'rian,** a fragrant herb of the Valerian Family and about which is woven many an ancient legend, sacred and profane. It is a native of Asia, and is a peculiar little plant whose hairy, tail-like roots seem to project above the ground in clustered stems and bear at their summit leafy flower stems with small, purple flowers. The leaves are long, pointed and stemless, and the blossoms are tubular with strongly-reflexed lobes. The spikenard ointment, mentioned in the Bible (*Mark xiv, 3,* and *John xii, 3*), was made from the root and was considered very precious, as may be seen by the costliness of the boxes in which it was kept. For a long time it has been used as an ingredient of the incense burned in the Roman Church. To people of the West the odor of spikenard is not particularly pleasing, but in Eastern lands the ointment is still prized; animals such as cats and rats seem to enjoy its odor and roll in it much the same as cats do in catnip.

American spikenard, or Indian root, is an aromatic herb of the Smilax Family, a relative of the sarsaparilla and like it used in the preparation of a tonic. In America it grows only through southern Canada and northern United States. See SARSAPARILLA.

Spinach, *Spin' aje,* or **Spinage,** a garden plant of the Goosefoot Family, raised for its long, soft leaves which are popular for greens. It is native in southern Asia, where it is commonly eaten, and from there has been introduced into Europe and the United States. The flowers are green in color, and the fruit, which in some species is armed with spines, is a dry pod. Spinach has a pleasing taste, but is not especially nutritious.

Spi'nal Cord, the mass of nervous tissue lying in the spinal column and extending from the brain to the second lumbar vertebra. It is nearly cylindrical in shape and is partly divided into right and left halves by two median clefts. It is about 17 inches long and about three-fourths of an inch in thickness, tapering at the lower end. The upper end is much enlarged and is continuous with the brain. This enlargement is called the medulla oblongata. The spinal cord comprises both white and gray matter. The white is arranged in fibers and forms the exterior and by far the greater part of the cord. It encloses the gray matter, which forms a peculiarly-shaped column whose vertical section resembles the letter H. Each lateral half of the spinal cord is divided by folds into three columns. Nerve roots originate in the gray matter and unite with the fibers of the white matter, forming roots. The sensory nerves arise in the anterior, and the motor nerves, in the posterior column. These nerves pass out in openings between the vertebræ, where they unite in a small ganglion, from which they extend to their respective parts of the system. They are joined together, and, to all appearances, constitute a single nerve, but the fibers of each are parallel to those of the other, and nowhere do they interweave.

There are 31 pairs of spinal nerves, which branch out into a network, traversing every part of the body. A central canal occupies the middle line of the cord and extends throughout its entire

length. The spinal cord is enveloped in membranes, which serve to support it and protect it from friction, and correspond with those surrounding the brain. The outer covering is a strong, tough sheath, called the dura mater. The inner membrane is a finer tissue known as the pia mater. A layer of flat cells lines the inner surface of the dura mater and the outer surface of the pia mater, and between the two lies a third membrane, the arachnoid. Between the two layers of the arachnoid is a watery liquid known as the cerebrospinal fluid. See NERVOUS SYSTEM; BRAIN.

Spin'dle. See SPINNING.

Spin'ning, the art of producing threads by twisting vegetable and animal fibers, like wool, flax, cotton and silk. Spinning is one of the most ancient of industries. The first spinning was accomplished by the use of the distaff and hand spindle, and this method is still practiced in some countries. The loosely-coiled fiber is held by a distaff or stick, and the spindle, consisting of a sort of a top or whorl, mounted on a round stick tapering at each end and having a notch for fixing yarn at the upper end, is held in the right hand and revolved by a movement against the right leg, while the left hand of the spinner gathers and supplies the fiber. The size of the thread is equalized by passing it between the thumb and forefinger until the motion of the spindle is exhausted, when the thread is wound around it, and the operation repeated. Despite this crude method of spinning, the Egyptians, by their great skill, produced the lightest and finest of threads, as shown in their fabrics.

The hand spindle was later improved by fixing it horizontally in a frame, and the whorl was grooved to receive a band that passed around a large wheel, operated at first by hand and afterwards by a treadle, so that the spinner could have both hands free. This was the spinning wheel (See SPINNING WHEEL). The next improvement in spinning devices was the invention of the spinning jenny by Hargreaves about 1764 in Lancashire. This was really the first spinning machine in which more than one thread was spun at a time. It was worked by hand, and consisted of a number of spindles revolved by belting from one common wheel or cylinder. This machine was improved upon in 1769 by Arkwright, who brought out his spinning frame, or water frame, so named because it was driven by water power. Crompton's mule-jenny, a combination of the jenny and frame, was introduced in 1779, and contains the principle on which all later spinning machines were built.

In spinning, there are many sizes of yarn and thread and different forms of twist, which are made by different speeds on different machines. Rapid motions draw out a fine, hard-twisted yarn, and slow motions produce a more loosely twisted and coarser yarn. In order to do this, rollers of different sizes running at different speeds pass the yarn back and forth until the required thickness is obtained. Many preliminary operations are required, depending upon the character of the fiber. See WEAVING.

Spinning Jenny. See SPINNING.

Spinning Wheel, a machine for spinning the fibers of cotton, wool and flax into yarn or thread. The wheel for spinning flax has an upright staff called the distaff for holding the material, and is operated by the foot. The wheel for spinning wool is operated by hand. It consists of a large band wheel mounted upon a standard which is attached to a frame, and a spindle mounted upon another standard at the opposite end of the frame and joined to the large wheel by a band. This wheel is operated by hand, the spinner using the right hand for turning the band wheel, and holding the wool in the left. The spindle revolves rapidly and twists the fiber into yarn. The fineness of the yarn depends upon the rapidity with which it is drawn out while spinning. See SPINNING.

Spino'za, Baruch, or **Benedict** (1632-1677), a famous Dutch-Jewish philosopher, born in Amsterdam, the son of a

wealthy Portuguese merchant. He received a careful education in the Bible and Jewish theology; but became alienated from the orthodox belief at an early age and was excommunicated from the synagogue in 1656. After five years he removed from Amsterdam to Rhynsburg, near Leyden, to escape the persecutions of the Jews. Three or four years later he settled at The Hague, where he spent the remainder of his life in seclusion, devoted wholly to science and philosophy. He refused a professorship at Heidelberg, lest it might interfere with his freedom of thought, rejected the offer of a French pension, and gained his modest support by grinding optical lenses. Abstemious in his habits, with a character of exalted excellence and purity, he lived the life of the ideal sage. The book containing the essence of his system, published the year of his death, is *Ethics Demonstrated in the Geometrical Order.*

Beginning with the dualism between the mind and matter, of Descartes, Spinoza attempted to secure unity by reducing these to one common infinite self-existent substance, which he called God. This substance manifests itself in the two "attributes" of mind and matter. Individual things are "modes" of this infinite substance. Spinoza's philosophy thus buries everything finite in the abyss of the Divine substance; but he fails to explain adequately the visible world. His "substance" has been compared to the lair of a lion, which many footsteps enter but from which none returns.

Spiny Ant'eat"er. See ECHIDNA.

Spirea, *Spi re' a,* or **Meadowsweet,** a flowering shrub of the Rose Family, common in gardens or upon lawns. The branches are slender and curving, and in the spring are covered with many clusters of tiny flowers, which completely hide the bare branches. The leaves, which appear with the flowers, are smooth and oblong, sometimes with entire margins and sometimes with cut or lobed margins. The shrub grows from two to three feet in height, and its willowly, flower-covered branches lend themselves readily to decorative purposes. It is a favorite ornamental shrub in America.

Spir'it Lev'el, a tool used by carpenters, surveyors and civil engineers. It consists of a small vial nearly filled with alcohol and set in a wooden or metallic frame, so that when the level is in use the vial will be in a horizontal position. The small air bubble in the vial comes to rest exactly at the middle point when the level is in a perfectly horizontal position, and the object upon which it is placed is said to be level. Carpenters use the spirit level in laying the foundations of buildings and for numerous other purposes. Surveyors and civil engineers have levels attached to their instruments for the purpose of measuring altitudes (See SURVEYING). The level is mounted in a variety of ways to adapt it to the different purposes for which it is used.

Spir'itualism, the belief that the spirits of the departed hold communication with the living. This belief has been held for several centuries, but modern spiritualism may be said to date from 1848, when a family by the name of Fox, residing in Hydeville, N. Y., were disturbed by mysterious rappings in different parts of the house. In due time these sounds were attributed to the spirit of a murdered peddler. Fox and his daughters afterward became mediums, giving seances in many cities of the country. The movement soon became widespread and spirit circles were organized in various places. The evidences of spirit communication at these seances consisted usually of rappings, table turnings, sounds of music, writings and the raising of heavy objects. Naturally, many frauds were perpetrated by those unscrupulous enough to use the seance as a financial scheme, and much discredit has attached itself to spiritualism. Of late years, however, scientific men have seriously investigated the claims of the believers in spiritualism, and so eminent a scientist as Sir Oliver Lodge has definitely announced his belief in the ability of departed spirits to

communicate with the living. The late William T. Stead was also convinced of the truth of spiritualism.

Spi"rom'eter, a device for determining the capacity of the human lungs. There are various forms used, the most common one consisting of two metal cylinders, one inverted and fitting into the other, forming a float. The lower cylinder is partially filled with water and is provided with a tube extending above it. When air is blown into this tube, the float rises and by means of a scale indicates the volume of air expelled from the lungs.

Spit'head", a roadstead on the southern coast of England, between Portsea Island and the Isle of Wight. A sand bank extending along the English shore for three miles gives it its name. Because of its convenient location and its adequate protection by circular towers, which keep out the wind from all sides except the southeast, it is the favorite anchoring place for the British ships, and its security has given it the popular name of "the King's bedchamber."

Spitz'ber"gen, a group of islands in the Arctic Ocean, lying about 430 m. n. of the coast of Norway. The largest islands are West Spitzbergen, Edge Island and North East Land. The entire surface is rocky, and the glaciers of the lofty plateaus are carried to the sea in deep and narrow fiords. There are mosses and flowering plants, and reindeer, polar bears and walruses. No country claims ownership of Spitzbergen and it is without permanent inhabitants. Recent polar expeditions have made it their starting point. Some mining is carried on.

Spitz Dog, or **Pom"era'nian,** one of the nearest relatives of the Eskimo dogs and popular as a house dog. It is an aristocratic looking dog with erect head and firm pose. The muzzle is sharply pointed, the eyes small but keen, the ears upright and pointed. The coat is long, thick and shaggy and the plumed tail is tightly curved upon its back. The name Spitz is applied to the smaller species which has been especially bred in England and the United States, where the dogs are great pets. The most prized of these are white with black-tipped muzzles; others are black, gray or reddish-brown.

Spleen, in physiology, the largest of the ductless glands. It is situated in the upper part of the abdominal cavity to the left of the stomach. It is generally oval in form, about five inches long and three or four inches broad; its weight is from six to seven ounces. The outer surface is covered by the peritoneum, the inner by a coat of connective tissue; and the whole is very soft and brittle. The function of this organ is not definitely known, but it is probable that it serves as a storehouse for certain nutritive food elements which it gives out as needed. It may be removed from the body without serious injury.

Splügen, *Shplu' gen,* an Alpine pass leading from the Swiss Canton of Grisons into Italy, between the Tambohorn and the Surettahorn. Its highest altitude is 6946 ft., and on the Italian side the descent is protected from avalanches by three large galleries constructed by the Austrian Government in 1834.

Spof'ford, Ainsworth Rand (1825-1908), American librarian, born at Gilmanton, N. H. He was editor of the *Daily Commercial* of Cincinnati, Ohio, and first assistant librarian in the Library of Congress. From 1864 to 1899 he was librarian-in-chief. He was distinguished for a remarkable, extended knowledge of books and their contents. He wrote frequently for the periodical press and edited several volumes on literary subjects.

Spoils System, a so-called system which permeates practically all the politics of the United States, Federal, state and municipal. When the principle of appointment and tenure of office by favor became general it soon became evident that the president would have to share the patronage with Congress. The result was that each congressman began to have control of appointments in his state or district. This privilege was soon looked upon as a "right" pertaining to

the position, and this doctrine is still largely held.

Under the spoils system the abuse of power became so great that in 1867 a report was made in Congress recommending civil service reform. In 1871 public sentiment was strong enough to bring about the passing of a law by which the president was authorized to make civil service rules and require test examinations, but no permanent good was accomplished. Real civil service reform began in 1883, when President Arthur signed the Civil Service Bill introduced by Senator Pendleton. This bill created a civil service commission, consisting of three persons, not more than two from one political party, to be appointed by the president and confirmed by the Senate. The rules framed by the commission are subject to the president's approval. In May, 1896, President Cleveland included practically all the Federal employees under the civil service law. The phrase, "spoils system," originated with W. L. Marcy of New York, who, in a speech in the Senate in 1832, declared that "to the victors belong the spoils." See CIVIL SERVICE.

Spo"kane', Wash., a city, port of entry and county seat of Spokane Co., 350 m. e. of Seattle, on both banks of the Spokane River and on the Great Northern, the Northern Pacific, the Idaho & Washington Northern, the Spokane, Portland & Seattle, the Oregon-Washington Railway & Navigation Company (of the Union Pacific system), the Spokane & International, the Chicago, Milwaukee & St. Paul and other railroads. The Spokane & Inland Empire Railway, an electric line, connects the city with the famous Cœur d'Alene region of Idaho and with points in eastern Washington and northern Idaho. Over 23 bridges cross the Spokane River, one of which is a solid concrete bridge costing $550,000, with a single span of concrete 281 ft. between the piers. The river at this point descends in a series of cascades, and the electric power generated by the falls furnishes light and power for all purposes in the city and surrounding country and is even transmitted to the Cœur d'Alene mines in Idaho, a distance of over 100 m. The surrounding country produces one-ninth of the wheat crop of the United States, one-third of the total lead output of the world, and large supplies of lumber and live stock.

PARKS AND BOULEVARDS. Spokane covers an area of over 39 sq. m. and has 2046 acres of public parks. The most important parks include Manito, Cœur d'Alene, Liberty and Indian Canyon. Ft. George Wright, west of the city, was established in 1895 on a tract of over 1000 acres given to the Federal Government by the city for that purpose. Spokane is famous for its beautiful near-by mountain lakes, some 38 in number, which add to the picturesque location of the city; and it is especially noted for its fine residences and wide and well-paved streets. Rockwood Boulevard, Cannon Hill and Brown's Addition are among the finest of the residential districts.

PUBLIC BUILDINGS. Among the noteworthy buildings are the Old National Bank Building, the courthouse, Federal Building, city hall, the Paulsen Building, Masonic Temple, the Athletic Club, the Sacred Heart Hospital, the Auditorium and American theaters, the Welch Building, the new Davenport Hotel, banks and about 140 churches. Spokane is the seat of a Protestant Episcopal bishopric.

INSTITUTIONS. Among the chief educational institutions are Spokane College (Lutheran), Gonzaga College (Catholic) for boys, Brunot Hall (Episcopal) for girls, Academy of the Holy Name, a number of private schools and academies, two large high schools and public and parochial schools. The benevolent and charitable institutions include St. Joseph Orphanage, Home for the Friendless, House of the Good Shepherd, Florence Crittenton Home, St. Luke's, Sacred Heart and the Marie Beard Deaconess hospitals.

INDUSTRIES. Spokane is a natural supply point for the gold-, silver- and lead-mining regions and is the greatest rail-

road center west of the Missouri River. The last few years the industrial interests of the city have increased with remarkable rapidity and today the city promises to become a factory center. Manufacturing establishments include cement factories, flour and grist mills, lumber and planing mills, foundries, lead-paint factories, macaroni factories, crayon factories, machine shops, brick and terra-cotta works, sewer- and water-pipe works, cereal-food plants, candy and cracker factories, ammonia factories, suspender and knitted-goods factories, soap factories and manufactories of tobacco products, soft drinks, jewelry, clothing, brooms, trunks, packed and canned meats, ornamental iron and wire products. There are also extensive grain elevators and a silo factory.

HISTORY. The first settlement was made in 1874 and named Spokane Falls in memory of the Spokane Indians. The word *Spokane* is said to mean Children of the Sun. The rapid growth of the city dates from 1883, when the Northern Pacific Railway was completed to this point. The first city charter was granted in 1881. A commission form of government was adopted in 1910. Population in 1920, U. S. census, 104,437.

Sponge, *Spunj,* a colony of cells, or microscopic bodies, supported by a common skeleton made up of tiny needlelike bodies called spicules. These separate cells, acting together, are the living animal, which is now scientifically classed in the group known as Porifera, or pore-bearers. The commercial sponge is the prepared skeleton, which has been the supporting framework of this communistic group. For many years sponges were thought to be vegetables, and, although they were found to be animals as early as 1860, their place in the general zoological classification was not given until nearly 20 years later.

Everyone is familiar with the commercial sponge and has noticed the numerous canals opening into still larger tubes, which perforate the mass. In life these canals were lined with actively working cells that formed within the skeleton and about it a gelatinous mass, which is not unlike a piece of liver in consistency and often in color. Almost the entire mass is a skin-covered series of digestive cells, which assimilate the food brought in by the action of the water. Sponges reproduce by budding or by means of tiny seed cells, called gemmules, which may be seen among the spicules of a living sponge colony.

SPONGE FISHERIES. Marine sponges are found in warm seas, generally attached to rocks or submerged timber upon the sea floors. They are brought up by divers or by the use of dredges and sponge hooks, which scrape the bottoms and detach the sponges from their supports. To prepare them for the market, they are left exposed to the air for some time or left in vats with a small supply of water; in this way the animal matter becomes decomposed and is easily squeezed out. The skeletons are then cleaned, dried and sorted. The drying is done in the sunlight, which also bleaches them. They are then sold by the fishers to the large dealers, who trim them, see that they are fully dried and ship them. The small pieces which have been trimmed away are used for stuffing mattresses and cushions and in the manufacture of a coarse cloth. On the sponges which have not been too carefully trimmed, a less porous, more compressed portion is visible; this is the part by which the sponge attached itself to a rock or other support, and is not desirable for commercial purposes because of its stiffness. There are many species of marine sponges; probably the best known are the yellow, the velvet, the sheepswool, the grass and the bath sponges.

CULTIVATION. In Florida the cultivation of sponges is becoming an industry of no small importance, for, although the sponge is chiefly known through its use as a toilet accessory, it is much more valuable for its use in the arts. In many trades they are absolutely indispensable, and probably no substitute will be found, especially if the cultivation of sponges continues practicable. Sponges, like oy-

sters, are free-swimming when young, but later must attach themselves to some clean, firm body upon which they thereafter remain fixed. The natural beds were at first so near shore that the fishers waded out to secure the easily discovered prizes. With the invention of the sponge hook, boats were used and beds farther from shore were fished; in spite of the large number of sponges taken out, the beds do not seem to diminish greatly in size. Sponges are planted by fastening cuttings of large sponges to heavy timbers, either by means of wire hooks or by pegging them into holes in the logs. These sections readily attach themselves and grow from one to two inches annually, or even more rapidly. Sponges are ordinarily taken when about four years old, although this differs according to the purpose to which they are to serve. The protection of the sponge beds by better legislation and an increased knowledge of the biology of the sponge that its habits may be better understood, will, no doubt, make sponge culture a profitable industry and will have the added value of preserving the natural beds from despoliation.

Other sponge-growing regions than those of Florida are the well-known Mediterranean beds of both Europe and Africa, Central American waters, Cuba and the Bahamas. For literature upon marine sponge fisheries, consult the bulletins of the United States Bureau of Fisheries, Vol. 28, 1908.

Fresh-Water Sponges. Fresh-water sponges resemble marine sponges in general appearance. They prefer pure water where there is a strong current so that the pores may not be clogged with mud. They are commonly found upon the undersides of loose-lying rocks, half-buried timbers, sluice-way casings and below the falls of old milldams. Lake Michigan possesses many species, and few clear streams of the United States are without some varieties.

Sponta'neous Combus'tion. See Combustion.

Spoon'bill", wading birds related to the herons and ibises. These birds, of which about six species are known, are distinguished by long legs and a long bill, the latter flattened and having a spoon-shaped end, with which the birds dig about in the mud in search of Mollusks and other food. Spoonbills live in nearly all parts of the world.

Roseate Spoonbill. This bird lives in the tropical and the subtropical regions in America and was formerly very common in Florida. It is about 36 inches long; the body is rose-colored, the shoulders are a rich carmine and the tip of the tail is almost an orange. The head is without feathers and it and the bill are colored black, green and yellow. The nest is made of large sticks and is placed in a small tree or bush. Usually three eggs are laid, which are blotched with lilac. The young are downy like the herons.

Spoon'er, John Coit (1843-), an American lawyer and statesman, born at Lawrenceburg, Ind. In 1859 he removed to Madison, Wis., where he graduated from the state university in 1864. Subsequently he served in the Civil War, being brevetted major, and was private and military secretary to Gov. Lucius Fairchild of Wisconsin from 1866 to 1867, when he was admitted to the bar. Later he was assistant attorney-general of Wisconsin, engaged in general practice at Madison and at Hudson, was elected to the State Legislature and served as United States senator from 1885 to 1891 and from 1897 to 1907, when he resigned. While in the Senate he was a recognized leader and won distinction as a debater and constitutional lawyer.

Spore, a one-celled body which in the lower orders of plants takes the place of the seed, and, like the seed, has for its object the reproduction of the plant. The spore differs from the seed in that it divides from the mother plant and requires no fertilization before germinating. Since the process of division, or spore production, cannot go on definitely without weakening the plant, the spores go into a resting stage after a number of generations. In this stage the plant regains its original vitality. The method

of spore production in the higher forms of spore-bearing plants closely resembles that of the production of seeds in the lower forms of seed-bearing plants. The spore-bearing plants are classed as cryptogams as opposed to the seed-producing plants, or phanerogams.

Spots'wood, Alexander (1676-1740), a colonial governor of Virginia from 1710 to 1722. Previous to his appointment to the governorship, he had served under the Duke of Marlborough and was dangerously wounded at the Battle of Blenheim. During his administration the affairs of Virginia were advanced along all lines, though he was often in conflict with the House of Burgesses because his plans had too broad a scope to meet their approval. He was the first to explore the Appalachian Mountains, and Mt. Spotswood was named for him. He attempted to extend the boundaries of Virginia and to break the chain of communication which the French had established between Canada and the Gulf of Mexico. He secured from the Six Nations a treaty by which they bound themselves to abandon the region east of the Blue Ridge Mountains. He was the author of the act to make tobacco notes the medium of circulation so that they could be used as money. Spotswood was interested in education and bequeathed his books, maps and mathematical instruments to William and Mary College. Because of his conflict with the local authorities over the disposal of church livings, he was removed in 1722. Nevertheless he was one of the most efficient governors of the colonial period.

Spott"sylva'nia Courthouse, Battle of, an engagement of the Civil War, fought May 10 and 12, 1864, near Spottsylvania Courthouse, Va., 50 m. from Richmond. After the fight in the Wilderness, Grant pushed on to Spottsylvania Courthouse, around Lee's right in the march on Richmond; but learning of his destination, Lee made a forced march and placed his army in battle array at Spottsylvania before Grant reached that point. There was heavy skirmishing for a few days, the battle opening on the 10th. The following day both armies rested, and Grant sent his famous dispatch to Halleck at Washington: "I propose to fight it out on this line if it takes all summer." On the 12th Hancock captured a weak position of the enemy's, which the Confederates made five desperate efforts to regain, Lee even starting to lead one assault in person. At the place called the "death angle" the hand-to-hand fight went on till midnight, and in severity equaled any other ever fought. Neither side won the battle, which was among the most terrible of modern times, the Federal loss being about 7000 men; the Confederate somewhat larger. A week later Grant ordered another movement around Lee's right wing. See CIVIL WAR IN AMERICA.

S. P. Q. R., *Senatus Populusque Romanus,* the motto surrounding the Roman standards and meaning *the Senate and the people of Rome.* The modern application of the letters is the business maxim, *small profits, quick returns.*

Sprain, a strain of the tendons or ligaments in any part of the body. The straining sometimes causes a rupture of the fibers or a displacement of bones, and may inflict permanent injury. Sprains of the ankle are not infrequent and though painful are usually treated without difficulty. A sprain in the back is apt to be more serious. In all cases of sprains there should be complete rest until the tissues have had time to heal, as serious and permanent injuries have been known to result from exercise of a joint too soon after such an accident. The inflammation which accompanies a lesion of this kind may safely be reduced with hot applications.

Sprat, a small fish of the Herring Family. In spite of its inferior size and flavor, the sprat is used as a food fish, probably because it is easily taken during the winter months. It is found in abundance upon European coasts, especially in the Mediterranean. The sprat has a slender, tapering body, a single dorsal fin and a forked caudal fin. It was once commonly mistaken for the young pilchard.

Spray'ing, a method of protecting plants from injurious insects and disease. It consists in covering the stems and foliage with a substance poisonous to the insects or to the fungus, but not harmful to the plant. The apparatus used to apply spraying mixtures are of various kinds. For house plants or small shrubs in the ordinary dooryard, a force pump with a pail containing the mixture is commonly used. For greater areas, trees and the plants in nurseries, barrel sprayers and tanks drawn by horses are of more frequent use. These are usually fitted with a long hose having nozzles of different kinds, according to the plants to be sprayed or the liquid which is being put on. See FUNGICIDE; INSECTICIDE; SPRAYING MIXTURE.

Spraying Mix'ture, a liquid to be sprayed upon plants to prevent the growth of fungus diseases or to check incursions of harmful insects. They are effective only when the insects that have attacked the plant are biting insects, which will feed upon the poisoned foliage, or when the disease may be checked by means of germicides. The United States Department of Agriculture and the various state departments issue many bulletins upon these mixtures and upon the methods of applying them. These bulletins may be had free upon application to the secretaries. See FUNGICIDE; INSECTICIDE.

Spring, the season of the year beginning when the sun enters the first point of Aries at the vernal equinox, about March 21, and continuing for about 93 days until the sun reaches the summer solstice, about June 21. At the vernal equinox the earth is moving southward (or the sun northward). The rays of the sun fall vertically at the equator, and in northern latitudes more nearly to the vertical each day, so that the impact of its rays is stronger, creating more heat; also the nights are growing shorter, giving less time for the earth to cool; and the days are growing longer, giving more time for the earth to be warmed. The result is the spring of vegetation into new life. See EQUINOX; SOLSTICE; ZODIAC; ARIES; SEASONS.

Spring, a stream of water issuing from the interior of the earth and appearing on the surface. The source of springs is the rain water or snow which filters down through the soil until arrested by an impervious stratum of rock through which it cannot pass. The water creeps through the soil very slowly, but after a time enough collects to form a subterranean reservoir, and sooner or later finds its way out at a lower level than that at which it entered. Meteoric water (rain and snow), by reason of the carbonic acid which it contains, dissolves the mineral and organic matter with which it comes in contact and thus often becomes charged with iron, magnesia, salts, soda, lime and sometimes silica. When the quantity of mineral matter held in solution is very large the water forms a mineral spring which is frequently of medicinal value, such as Saratoga Springs in the United States and those of Karlsbad, Germany. Warm springs are common in volcanic regions. Some springs are *intermittent,* flowing for a time and drying up in times of drought; in others the flow fluctuates to such an extent that the springs are called *variable springs.*

Spring'bok", a South African gazelle of the Bovine Family. It is a light, graceful animal, having an inquisitive face, the beautiful eyes so common to this family, and erect, lyre-forming horns. The neck is long and arching, and the long ears stand as if always pricked for the slightest sound. The back is rounding, and the legs are slender but long. The general color is fawn, but the under parts, the rump, the ridge of the back and lines upon the face are pure white. The white ridge is made up of long hairs which are often erected as the animal runs. Springboks travel in great herds and have received their name from their habit of leaping into the air, sometimes to a height of 10 or 12 ft., as they canter across a plain. To see a whole herd traveling in this manner is an interesting sight.

Spring'field, Ill., a city, county seat of Sangamon Co., and capital of the state, 185 m. s.w. of Chicago and 90 m. n. of St. Louis, on the Illinois Central, the Wabash, the Baltimore & Ohio Southwestern, the Chicago & Alton, the Cincinnati, Hamilton & Dayton, the Chicago, Peoria & St. Louis and other railroads. There is excellent street-car service to all parts of the city, and interurban electric lines connect with St. Louis, Peoria, Bloomington, Danville and near-by towns and cities of the central portion of the state. Springfield is an important shipping point for a large agricultural region and also the center of one of the greatest soft-coal districts in the United States. The Illinois State Fair is permanently located here. There is also a state rifle range and a military camp ground.

The city is compactly built and has wide, well-paved and beautifully shaded streets and many handsome and stately residences, including the governor's mansion. There is a fine park and boulevard system which includes Matheny, Lincoln, Washington and Reservoir parks, containing a total area of 442 acres. In Oak Ridge cemetery, near the city, is the Lincoln National Monument erected with funds raised throughout several states by a Lincoln Monument Association. This monument was designed by Larkin G. Mead and consists of a granite obelisk 121 ft. above the center of a mausoleum which contains the remains of President Lincoln and family. At the foot of the obelisk are four groups in bronze, symbolizing the army and navy of the United States, besides a heroic statue of Lincoln. The monument was dedicated Oct. 15, 1874, and transferred to the state in 1895. Lincoln's home, which he purchased in Springfield in 1844, is also owned by the state and is open to the public.

The most notable building is the massive capitol which was begun in 1867 and completed in 1887. This, the second capitol to be erected in Springfield, cost about $4,500,000. It stands in a park of eight acres. This building, of Joliet limestone, is in the form of a Greek cross and has an extreme length of 379 ft. and an extreme width of 286 ft. The symmetrical dome is 364 ft. high. The old capitol, now Sangamon County Courthouse, is of special historic interest because in it Abraham Lincoln had his office from the time of his election as president until his departure for Washington. Other interesting structures are a city hall, Masonic Temple, a state arsenal and armory, Illini and Sangamon clubhouses, Supreme Court Building, post office, a number of banks and fine business houses. There are about 55 churches.

INSTITUTIONS. The educational institutions include Concordia College (Lutheran), Ursuline and Sacred Heart academies (Catholic), St. Peter's and St. Paul's convents, St. Agatha's School, a high school, public and parochial schools, the state, the state historical, the Supreme Court Law and the public libraries. The benevolent and charitable institutions include the Springfield and St. John's hospitals, Orphanage of the Holy Child, David Prince Sanitarium, homes for aged women and aged people, home for the friendless and a home for colored people.

The city has extensive manufacturing industries which are represented by planing and woodworking mills, machine shops and foundries, engine and boiler works, railroad shops, printing and publishing works and manufactories of watches and watch material, automobiles, shoes, flour, farm implements, brick, saddlery, clothing and soft drinks. The city is an important horse- and cattle-breeding center.

The first settlement was made in 1819 and the town became the county seat in 1823. A city charter was granted in 1840. It was selected as the state capital in 1837 and the State Legislature assembled here for the first time two years later. The city has the commission form of government. Population in 1920, U. S. census, 59,183.

Springfield, Mass., a city and county seat of Hampden Co., 99 m. s.w. of Bos-

ton and 136 m. n.e. of New York City, on the left bank of the Connecticut River, here crossed by four large bridges, and on the Springfield Division of the New York, New Haven & Hartford, the Boston & Albany, the Boston & Maine and other railroads. Interurban electric lines connect the city with the near-by towns and villages. The area of Springfield is over 38 sq. m. It is one of the handsomest towns in the state and is especially attractive as a residential city. The site comprises the level along the river bank and the west portion of an elevated plain extending several miles east. Springfield has wide and well-shaded streets, and the elevated sections of the city command delightful views of the Connecticut Valley. There is an extensive public park system of over 500 acres, besides several public playgrounds. Forest Park is especially beautiful, and in Court Square stands a Soldiers' and Sailors' Monument and a statue of Miles Morgan. In Merrick Park stands a statue called *The Puritan,* by Saint Gaudens; and a pedestal bust of the late President William McKinley, by Philip Martiny, is placed on an eminence adjoining the Barney estate, in the lower part of the city, which overlooks a broad expanse of the Connecticut River.

Among the noteworthy buildings are the Church of the Unity, Art Museum, housing the George Walter Vincent Smith collections; Museum of Natural History and Science; new city library, containing 190,000 volumes and costing, including furnishings, $350,000; new municipal group, costing about $1,500,000, consisting of the Municipal Building, Auditorium and Campanile Tower; Springfield Fire and Marine Insurance Company's Building; the home of the Massachusetts Mutual Life Insurance Company; and the Y. M. C. A. and Y. W. C. A. buildings. The educational institutions include well-equipped school buildings, comprising the Central and Technical high schools, a vocational school, the American International College, International Young Men's Christian Association, H. S. of Commerce, the MacDuffie schools for girls, Springfield Boys' Club, People's Institute, a home for aged women and the Springfield, the Wesson Memorial, the Mercy and the Hampden hospitals.

Springfield is noted for the diversity of its manufactures. A Federal arsenal, established here in 1795, is the most extensive in the Union and is the principal manufactory of small arms for the United States army. It was after a visit to this arsenal that Longfellow wrote his well-known poem *The Arsenal at Springfield.* Other manufacturing industries are represented by iron and brass foundries, machine shops, cotton and woolen mills, railroad-car shops and manufactories of rubber goods, tobacco and cigars, bicycles, motor cycles, automobiles, buttons, electrical appliances, skates, needles, valves, dictionaries, toys, art goods, confectionery, forgings and lumber products. The city is also a printing and publishing center.

The first settlement was made in 1636 by a party of settlers from Roxbury under the leadership of William Pynchon, and called Springfield from the English town of the same name, which was the former home of Pynchon. During King Philip's War in 1675 the town was attacked by the Indians and burned, but was quickly rebuilt. In 1786 Springfield was the scene of Shays's Rebellion. It received a city charter in 1852. Population in 1920, 129,338.

Springfield, Mo., a city and county seat of Greene Co., 130 m. s. of Jefferson City and 200 m. s.e. of Kansas City, on the St. Louis & San Francisco, the Missouri Pacific, the Kansas City, Clinton & Springfield and other railroads. Springfield is situated on the ridge of the Ozark Mountains, 1400 ft. above sea level, in a region which abounds in valuable deposits of lead and zinc. The city also has extensive fruit, grain, lumber and live-stock interests. Springfield is regularly laid out with wide, well-paved and shaded streets and has attractive residential districts. There are four parks with a total area of 340 acres, Doling Park being the largest. On the outskirts

of the city are three large cemeteries: a National cemetery and a Confederate cemetery, both maintained by the United States Government; and a city cemetery.

PUBLIC BUILDINGS. Among the noteworthy structures are the Greene County Courthouse, Federal Building, Springfield Club Building, Colonial Hotel, municipal buildings, Frisco and Woodruff buildings, Country Club Building, a number of banks, theaters, substantial business blocks and a large number of churches. Springfield is the seat of Drury College, coeducational, founded in 1873; a state normal school, Loretto Academy (Catholic), a high school, public and parochial schools and a public library. Near the city is the Academy of the Visitation. The benevolent and charitable institutions include St. John's Hospital and the Springfield Frisco Hospital.

The chief industrial establishments include two large railroad and repair shops, wagon and carriage factories, flour and grist mills, machine shops, ironworks, novelty works and furniture factories. The mining and marketing of lead and zinc are important industries and the jobbing trade is extensive, especially for a large part of the southern counties.

Springfield was settled about 1819 as an Indian trading post. The town was incorporated in 1838, and in 1847 was chartered as a city. Springfield was one of the most important strategic points west of the Mississippi River at the opening of the Civil War. In 1861-62 it was controlled a number of times in succession by the Union and Confederate forces, the former gaining control of the city after the spring of 1862. The Battle of Wilson's Creek, about ten miles south of Springfield, was fought in August, 1861. North Springfield was annexed to the city in 1887. After 1902 there was a rapid growth in both population and industries. Population in 1920, 39,620.

Springfield, Ohio, a city and county seat of Clark County, 45 m. s.w. of Columbus, at the confluence of the Mad River and Lagonda Creek and on the Erie, the Cleveland, Cincinnati, Chicago & St. Louis, the Detroit, Toledo & Ironton and the Pennsylvania railroads. Six interurban electric lines provide direct communication with the cities of Xenia, Dayton, Columbus, Bellefontaine, Urbana, Troy, Piqua, South Charleston and other towns and cities. Springfield is situated in a productive farming region, while the excellent water power has aided in making the city an important industrial center. The older portion of the city is in the narrow valley of the Lagonda Creek, but the newer portion has spread over the higher land until the city now occupies an area of over eight square miles. There is an excellent supply of natural gas. Springfield has many miles of paved and shaded streets with well-kept lawns and gardens. There are many handsome residences. Snyder Park of 217 acres is the largest of the city parks. Ferncliff, the principal burial ground, occupies a site of great natural beauty. The noteworthy buildings include the Clark County Courthouse, city building, in front of which is the handsome Kelly fountain and esplanade, Lagonda Club Building, Y. M. C. A. Building, Federal Building, new $300,000 high school, Big Four Station, Pennsylvania Station and the Ohio Electric Depot, substantial business blocks and a number of banks. There are over 50 churches, many of them of artistic beauty and design.

The educational institutions include Springfield Seminary, public and parish schools, several business colleges and a number of private schools. Wittenberg College (Lutheran), founded in 1845, is situated on a hill on the north side of the city. The Warder Public Library, containing a large number of volumes, is a gift from Benjamin H. Warder. On hills near the city border are the Ohio State fraternal homes of the Independent Order of Oddfellows, Masons and the Knights of Pythias, the city donating the sites on which the institutions are located. There is a well-equipped city hospital.

Springfield has extensive manufacturing interests, which are represented by

foundries and machine shops, agricultural-implement works, iron, steel and brass works, flour mills and manufactories of wearing apparel, chemicals, undertakers' supplies, gas and steam engines, mechanical appliances, piano plates, paper, turbine wheels, windmills and gristmill products. Springfield is noted as a floral center, one firm being the largest grower of roses in the world.

James Demint made the first plat of the town in 1801, near the border line which had been fixed between the whites and the Indians. The latter threatened trouble until a council was held at which Tecumseh was the speaker for the Indians. Peace was later established. Springfield was made the county seat in 1818 when Clark County was erected. A city charter was granted in 1850. Population in 1920, U. S. census, 60,840.

Spring Hill, Battles of, during the Civil War two engagements in Tennessee. The first occurred March 5, 1863, when Van Dorn, with 20,000 Confederates, surprised and defeated 2600 Federals under Coburn, whom Rosecrans had sent to aid Sheridan. At the end of the day Coburn's ammunition was exhausted and he surrendered 1300 infantry. Later, Nov. 29, 1864, a small detachment of Hood's army here fell upon Stanley, with a company of Federals from Thomas's army, who was guarding a baggage train. There was no decisive victory.

Spring Valley, Ill., a city of Bureau Co., 17 m. s.e. of Princeton and 100 m. s.w. of Chicago, on the Illinois River and on the Chicago, Rock Island & Pacific, the Chicago & North Western, the Chicago, Burlington & Quincy and other railroads. It is situated in a coal-mining region and is engaged chiefly in mining. Other industries are shipping, farming and manufacturing. The town contains foundries, pump factories and machine shops. Spring Valley was settled in 1850 and chartered as a city in 1886. Population in 1920, U. S. census, 6493.

Spruce, a name given to a number of species of valuable and handsome trees of the Pine Family. In general they have tall, tapering trunks, frequently broadened at the base, scaly, reddish-brown bark, soft, resinous wood, stout branches and needlelike leaves, shorter than those of the true pines. The flowers of the spruce are inconspicuous and the fruits, like those of all pines, are scaly cones.

The Norway spruce is a valuable lumber tree and is frequently planted for ornament. The black and the red spruce grow in the North and East and are valued for their resin, from which spruce gum is made, and for their bark, used for wood pulp. The white spruce has a disagreeable odor but is a useful tree; it is found from the Arctic Circle as far south as Iowa. The blue spruce is a beautiful tree, especially in its youth, but is apt to bear remains of dead branches in its maturity; its foliage has an unmistakable blue-green shade and grows in full round clusters which render the tree particularly attractive. The spruces often grow in high altitudes and form great forests on mountain slopes. They are found in northern and central Europe, the Himalayas and Japan, as well as in North America.

Spurge, *Spurj,* or **Euphorbia,** *U for' bi a,* **Family,** a remarkable family of widely differing plants found mostly in tropical countries but represented in the United States by a number of species. They are herbs, shrubs or trees with milky juice and ordinary foliage, but may have large thickened stems and much reduced leaves like the cactus, or may have slender stems and large leaves. In spite of these wide external differences, the spurges are an easily identified class of plants if one studies their minute structure. A typical spurge is the Mexican poinsettia, a woody, conservatory plant which blooms about Christmas time and is becoming popular as a Christmas emblem. The leaves are oblong, with a few lobes or else entirely undivided, and slightly downy below. Those clustered about the flower are a bright vermilion color and are so petal-like that they are generally mistaken for a part of the flower. The true flower,

however, is a globular, green cup having a great yellow gland at the top of one side. The fruit is a dry little pod which bursts to discharge its seeds.

Other spurges are found wild in the West and Southwest and many are weeds; all have a peculiar but highly interesting flower structure. The tree box, or box, planted as a garden or walk-border plant, and the castor bean are members of this same family.

Spurgeon, *Spur' jun,* **Charles Haddon** (1834-1892), a celebrated English preacher, born at Kelvedon, Essex. In 1850 he joined the Baptist Church, shortly after which he began to deliver cottage sermons in Cambridge, becoming popular as a "boy preacher." At the age of 18 he had charge of a Baptist Church in Waterbeach, two years later removing to London, where he was the successful pastor of New Park Street Chapel. In 1861 there was opened for him the Metropolitan Tabernacle in Newington Butts, in connection with which many evangelistic and philanthropic enterprises developed. In theology Spurgeon was a Calvinist, but was always independent in his views and actions, withdrawing from the Baptist Union in 1887 because of the rationalist tendencies of its leaders. He was an interesting and vigorous speaker, holding the attention of his hearers through long sermons. Besides his printed sermons, which had an enormous circulation, he published, among other volumes, *John Ploughman's Talks, The Treasury of David, Lectures to My Students* and *Commenting and Commentaries.*

Spy, a person employed to secure knowledge of the position, resources and plans of an enemy. The disgrace that is frequently associated with a spy is often not deserved. When a spy is a traitor to his country then the disgrace is, of course, deserved; but spies are usually employed regularly by officers in the army, and also frequently in civil life. The duties of a spy place his life in constant danger, and, if captured, he is put to a shameful death. Nathan Hale was a famous American spy.

Squab, the featherless nestling of a pigeon raised for the market. The raising of squabs is becoming an important industry in the United States, where they are considered a delicacy. The pigeons are kept in large, screened yards fitted with nests and roosts. The squabs are marketed when about four weeks old, or when weighing about three-quarters of a pound each; up to that time they have been fed by the parent birds by a process known as regurgitation, or the casting up of partially digested food into the mouths of the young. They sell for from 30 to 75 cents apiece and are eaten broiled or fricasseed.

Squad'ron. See CAVALRY.

Squall, a local wind storm at sea, usually of brief duration. Squalls belong to the same class of storms as waterspouts and tornadoes, being cyclonic in character and due to marked local differences in temperature. They usually occur along the coasts of continents at a distance ranging from 10 to 20 m. from shore. When accompanied by sufficient precipitation, they are called rain squalls or snow squalls, as the case may be. In tropical seas these whirlwinds often arise when there is not sufficient moisture in the air to form a storm cloud. There is usually, however, at the top of the vortex a small, harmless-looking white cloud in violent agitation. This cloud has given rise to the name white squalls or bull's-eye squalls for this kind of a storm. Such storms are of frequent occurrence off the west coast of Africa.

Squash, a plant or the fruit of a plant belonging to the Gourd Family and cultivated in gardens of the temperate zones. The vine is generally prostrate upon the ground and bears large, thick, green leaves that have sharply-pointed lobes. The large tubular flowers are orange-yellow in color and are followed by the somewhat globular fruits. These fruits, also called squashes, vary in shape, color and size, according to species. The most familiar are the thick-skinned, heavy Hubbard squashes which retain their green color when ripe; when picked in the fall they may be stored for winter

use. So hard are their rinds that they have to be split open, but the mealy interior is sweet and very pleasing to the taste. Squashes are eaten baked or steamed and are a natural part of a New England dinner in winter. Other winter squashes have yellow or orange-colored rinds, but these are not so popular.

Summer, or crook-necked, squashes are climbing or bush varieties. The fruits have more tender rinds of bright yellow color, and they are of rough, warty appearance. As one of their common names implies, they have slender, curving "necks" and are somewhat swollen at one end. The summer squash does not keep well and is essentially a summer vegetable.

Squash Bug, a harmful, ill-smelling bug of the Coreid Family. It has a general gray-brown color, two long antennæ, arising from a triangular head, a parallel-sided body and somewhat transparent wings having dirty yellow or brownish spots at the margin. The under surface of the body is yellow. The squash bug appears early in the spring, after hibernating in the adult stage. The eggs are laid upon the young squash, cucumber and pumpkin vines, and in two weeks hatch into tiny green insects which gradually turn brown. The vines should be protected by mosquito-net frames until of a size to resist the sap-sucking propensities of this pest.

SQUASH BUG

Squat'ter Sovereignty, *Sov' er in ty,* in American history, a term used to denote the right of the inhabitants of any territory to govern themselves without Federal interference. Specifically it relates to that right as applied to an unorganized territory inhabited by so-called "squatters," or persons who have taken up land without purchasing titles. The doctrine of "squatter sovereignty" was of great importance during the slavery controversy, when it was incorporated in the Kansas-Nebraska Bill by Stephen A. Douglas. This bill provided that the people of each territory should decide for themselves whether slavery should be permitted or prohibited within its borders. The advocates of this method of settling the slavery question named it "popular sovereignty;" its opponents in derision called it "squatter sovereignty." Though the theory was proposed in order to protect the rights of the slaveholders, and to allow the extension of slavery, it was repudiated ultimately by the South and finally led to a division between the Northern and Southern Democrats. See KANSAS, subhead *History;* KANSAS-NEBRASKA BILL.

Squawk. See NIGHT HERON.

Squid, a name locally applied to various members of the group Cephalopoda, which includes such marine animals as the cuttlefish, octopus and argonaut, or paper nautilus. The name is most commonly applied to the large species taken along the coasts of Newfoundland. See CUTTLEFISH; CEPHALOPODA; OCTOPUS; PAPER NAUTILUS.

Squill, a small, bulbous plant of the Lily Family and the source of a drug of the same name. It has a pale, fleshy stem, rising from a coated bulb, which also produces oblong or long leaves. From the midst of these leaves a stem of nodding, fragrant flowers extends. The individual blossoms are bell-like and are white or blue-shaded in color. The drug called squill is derived from the bulb and is prescribed as an emetic and as a cough and croup remedy.

Squint'ing, or **Strabismus,** *Stra biz' mus,* a defect in vision caused by inability to direct both eyes upon an object at once. The squint may be inward, when the eye is turned towards the nose; outward, when the eye is turned towards the temple; or vertical, when the eye is turned upward or downward. The squint may cause the patient to see double objects, and when it reaches this stage it is somewhat dangerous. A person going down stairs sees two stairs and attempts to step on the false one with disastrous results. Squinting is usually caused by paralysis or excessive contraction of one or more muscles controlling the movements of the eye, or by a lesion where the

optic nerve joins the center of vision in the brain. The first cause can usually be remedied by a surgical operation, the second by spectacles. Temporary squinting is sometimes caused by fatigue, by a cold or other disease. In such cases normal vision returns with the removal of the disturbing cause.

Squirrel, *Skwur' el,* a name applied to an interesting family of Rodents, members of which are found in all parts of the world except Australia. It comprises the groups known as ground squirrels, tree squirrels, flying squirrels, water squirrels, or beavers, woodchucks and prairie dogs. All are active, seemingly busy animals, small in size, trimly built and coated with more or less valuable fur. Their activity is mainly exercised in collecting stores for later use. The attractive common squirrel is typical of the family. His bright eyes and saucy face peer at one from branches of low-hanging limbs, and his scolding chatter is a candid and continuous expression of his opinion of an intruder. However, he appears to look upon his torrent of abuse as a joke, for a frisk of his tail and a leap to a new limb, upon which he continues his tirade, seem to have a hint of mirth in them.

The squirrel has a plump, furry body, sharp claws as befits a tree dweller, and a curving, bushy tail which generally forms a thick blanket for his back as he sits upon his haunches and gnaws through the hard shell of a perfect nut; well he knows, too, which nuts are wormy and these he casts aside with disdain. Frequently he stores two of the good ones in the pouches of his cheeks and skips off to deposit them in a securely hidden hoard. These hoards are more a matter of habit than of necessity, though the squirrel does not really hibernate, and often his store will contain over a bushel of nuts. He feeds upon flesh and herbs as well as upon fruits, however, and is a daring robber. His gait is a succession of leaps and bounds made possible by a very elastic spine.

The red and the gray squirrels are probably the most common varieties. The English squirrel is known throughout the British Isles; Fremont's and Albert's are Western varieties, and the Mexican and Central American species are often brightly colored. The flesh of all squirrels is edible.

Squirrel Corn. See DICENTRA.

Squirreltail Grass, Squirrel Grass or **Wild Barley,** a member of the Grass Family, found in marshes from the Atlantic coast west to the Mississippi and known as an unwelcome resident in the farmers' grain fields. Squirreltail grass has a hollow, cylindrical stem, generally two feet high, and broad, grasslike leaves with roughened edges. The spikes of flowers are surrounded by a fine, bushy beard nearly six times as long as the tiny flowers, which, when mature, resembles the tail of a squirrel. This plant is particularly obnoxious because it spreads rapidly, is injurious in fodder, and, clinging to the wool of sheep, renders the quality of the wool inferior.

Stack'er, a farm implement used for stacking hay or straw. It consists of a fork operated by means of ropes and derricks and run by horsepower. There are two main classes in use at present in the United States. The over-shot stacker raises the load in much the same way as a board is raised upon one end, and carries it completely over the machine. The swing stacker lifts the load vertically, swings it over the stack and drops it in place.

Sta'dium, originally the name of a Greek race course at Olympia, afterward given to other places throughout Greece where races and physical contests were held, and today applied to similar athletic fields, or amphitheaters, throughout the world. Commonly the stadium has permanent seats, sufficient for a large number of spectators. The Greek race course was straight, and in length measured 600 Greek ft., 625 Roman ft. and, in our English system, 606¾ ft. As a unit of length, therefore, the stadium is approximately equivalent to an English furlong, one-eighth of a mile.

Staël-Holstein, *Stah' el-Hol' stine,* **Anne Louise Germaine** (1766-1817), a

famous French writer, commonly known as Madame de Staël. She was born in Paris, and her father was the eminent minister of finance, Jacques Necker. While still a girl her mind was stimulated by her association with a brilliant group of wits and critics of the pre-Revolutionary decade. In 1786 she married the Swedish minister, Baron de Staël-Holstein, a union which proved unsatisfactory. In 1788 she published her *Letters on Jean Jacques Rousseau,* whose social ideas she greatly admired. Although she exercised considerable influence at the outbreak of the Revolution, she was obliged to flee from France during the Reign of Terror, after vainly attempting to save her friends and the royal family. Madame de Staël returned to Paris during the period of the Directory, but in 1803 she was banished by the consular police, having offended Napoleon by her biting epigrams. Later, in Germany, she met Goethe and Schiller, and became a close friend of A. W. Schlegel, a leader of the Romantic School in Germany. The Romantic movement in France is in large measure the work of Madame de Staël. Her writings include the novels *Delphin* and *Corinne, On Germany* and *Thoughts on the French Revolution.*

Staff (Military). See ARMY, UNITED STATES, subhead *Staff.*

Staff, a plasterlike covering for buildings made of cement and sand, held together by fibers of jute. Staff was used extensively on the buildings of the Paris Exposition in 1889, the buildings of the World's Columbian Exposition at Chicago in 1893 and of the Louisiana Purchase Exposition at St. Louis in 1904. Besides being cheap and light, it can be molded to any desired form. However, it is unsuited for permanent structures that are exposed to the weather.

Stag, a term used in America to refer only to the adult male of the red deer; elsewhere the term is frequently used to refer to members of both sexes. The male has huge, branching horns and a noble carriage; it is also called the hart. The female, called the hind, is smaller, more delicate and bears no antlers. The stag is found wild in the British Isles, northern United States and Canada. Locally, any male deer is called the stag. See DEER; WAPITI; ELK.

Stag Beetle, a family of large and powerful beetles, with long, curved jaws which resemble the horns of the stag. Beetles of this family appear during July and August, flying about with a loud, continuous buzzing, and entering houses, where, however, they do no harm other than the annoyance they cause. The body is of rich brown color; in the male it is smooth; in the female, slightly ridged. The eggs are laid underneath the bark of old cherry, willow and oak trees and hatch into large, white larvæ, with curving bodies and reddish heads. The larvæ, which take six years to reach maturity, do great damage to the wood of the tree in that time. Removing and burning infested branches seem to be the only sure prevention of the spread of the pest, but a wash of soft soap, thickened with washing soda, is also helpful. The pupa of the stag beetle rests in the back of a burrow tunneled by the larva, and issues from there as an adult beetle. Stag beetles are often mistaken for June bugs or May beetles, but may be readily distinguished by their color and by their horns.

STAG BEETLE

Stag'hound", a now nearly extinct variety of hound formerly used in coursing the stag. It was a popular breed in England until superseded by the foxhound, which it greatly resembled. It is of heavier build, has a large head with broad muzzle, wide forehead and thick neck. Its limbs are especially strong and it is noted for its fleetness. Its height is about that of the bloodhound. The replacing of the staghound by the foxhound has doubtless come about through the trimmer build and greater endurance of the latter in the chase.

Stain'er, Sir John (1840-1901), an English organist and composer. He was recognized as one of the leading organists of his time and was organist at St. Paul's, London, from 1872. He is most widely known, however, for his cantatas and oratorios. Among the best known of these are *The Crucifixion, Saint Mary Magdalene* and *The Daughter of Jairus.*

Stake Driver. See BITTERN.

Stalactite, *Sta lak' tite,* deposits of lime, sometimes chalcedony and other minerals, which hang from the roofs of caverns in limestone rock and which have been forming for ages. The process of formation appears to be continually going on. Water, such as rain water, containing carbonic acid, readily dissolves the carbonate of lime in the limestone rock while passing through the rock crevices above the cave. Upon reaching the cavity and becoming exposed to the air, the water evaporates and the lime remains on the surface of the roof. In course of time, long pendant masses resembling icicles accumulate. Sometimes the water drops to the floor of the cave; the layer thus formed is called stalagmite. This formation grows upward and often meets the pendant masses above to form columns of great beauty. Stalactite formations are sometimes found under bridges and arches and in old buildings, where water seeping through masonry has held in solution the lime present in the cement between the stones.

Stal'warts. See HALF-BREEDS.

Stam'ford, Conn., a city of Fairfield Co., 75 m. s. w. of Hartford and 33 m. n. e. of New York, on Long Island Sound and on the New York, New Haven & Hartford and other railroads. Electric railway lines extend to all the near-by towns and cities. The harbor is deep enough for all the large Sound vessels, and the city has regular steamer connection with New York. Stamford is attractively situated in an agricultural region with the Noroton River on the east, the Mianus on the west and the Rippowam flowing through it. Many business men of New York City reside here and the hills in the city are embellished with handsome residences and numerous parks. Stamford is the commercial center for a large region.

The educational institutions include the Manor School for boys, Catherine Aiken School for girls, King School, Stamford Preparatory School, Misses Low and Heywood School and the Ferguson Library. Other institutions include the Convent of our Lady of Lourdes, St. John's Church House, a day nursery, Stamford Hospital, with new buildings erected in 1912, Stamford Children's Home, opened in 1895, and Associated Charities Building, erected in 1911. The clubhouses of the Suburban Club and Stamford Yacht Club are located here. Shippan Point, a popular resort, is situated on the Sound, one mile south of the city. Near the Point is Hallowe'en Park, for whose purchase and development the city has expended about $300,000.

The manufacturing industries of Stamford are important, the city being especially known for its manufacture of locks, keys and builders' hardware. There are also manufactories of typewriting machines, pottery, patent medicines, dyestuffs, gas ranges, drugs, woolen goods, clothing, millinery, wagons and carriages, chemicals, extracts, hats, pianos and lumber and machine-shop products.

Stamford was settled in 1641 by a colony from New Haven. It is situated on the site of an Indian village named Rippowam. The name was changed to Stamford in 1642. The place was chartered as a borough in 1830 and as a city in 1894. Population in 1920, U. S. census, 35,086.

Stam'mering, a defect of speech occurring in the mouth in the form of faulty articulation. It is due to a lack of coordination between certain muscles and the nerves which stimulate them. The terms *stammering* and *stuttering* are used indiscriminately to denote speech impediment, though stuttering implies the rapid repetition of the first syllable of words beginning with *p, b, t* or *d.*

Stuttering is a physical difficulty, while stammering is mental. The latter often begins with a hesitancy to pronounce certain words; and this hesitancy becomes an aversion, leading to a nervous fear. The infirmity is frequently the result and the cause of self-consciousness and timidity. The trouble is not hereditary, as is often supposed, but children sometimes fall into the habit of stammering in unconscious imitation of parents. Stammering resulting from deformity of the speech organs is very rare.

Stamp Act, an act regulating the imposition of stamp duties; in American history, an act passed by the British Parliament and signed for George III on March 22, 1765. It was to be effective after Nov. 1, and prescribed (1) that stamped paper be used for all legal and official documents; (2) that stamps be placed on such articles as playing cards, newspapers and calendars; and (3) that trial by jury be denied at the pleasure of the prosecuting officer. News of the passage of the Stamp Act came to the colonies in May, 1765. Everywhere resentment was expressed on the ground that the Americans were being taxed without representation in Parliament and that the duties would be a hardship. Many stamp agents were forced to destroy their stamps or resign, many were attacked and considerable property was destroyed, the act being practically nullified by the time it was to go into effect. Resolutions denouncing Parliament were passed by many of the colonial Legislatures, pamphlets were written and the Stamp Act Congress met (See STAMP ACT CONGRESS). Moreover, the first of November was set aside as a day of mourning. Finally, March 18, 1766, Parliament repealed the objectionable act, having previously, however, reiterated its right to "bind the colonies—in all cases whatsoever." This incident was one of the chief immediate causes of the Revolutionary War.

Stamp Act Congress, a convention of delegates from all the American colonies save New Hampshire, North Carolina, Virginia and Georgia, which met at New York, through the call of Massachusetts, from Oct. 7 to Oct. 25, 1765, some few weeks before the Stamp Act passed by the British Parliament was to become effective. The meeting was secret and after due consideration a *Declaration of Rights and Grievances of the Colonies in America* was drawn up. This acknowledged subordination to the British Crown, but protested that the colonies could be taxed only by their own consent or that of their representatives; claimed the inherent right of trial by jury; and maintained that the Stamp Act was an attack on the rights and liberties of the colonies. Delegates from six of the nine colonies represented signed this document, which the House of Commons considered the work of an unconstitutional body. Furthermore, the King was addressed and Parliament was petitioned to repeal the Stamp Act.

Stamp'weed". See INDIAN MALLOW.

Stand'ard Cell, a voltaic cell adopted for furnishing a standard of potential difference. The cell recommended by the National Academy of Sciences, and adopted by act of Congress for this purpose in the United States, is known as Clark's cell. It consists of a glass vessel having two tubes, A and B, not less than two centimeters long, joined by a common neck fitted with a glass stopper. At the bottom of each tube is a small wire sealed into the glass. The wire in tube A is covered with pure mercury and that in B with an amalgam of nine parts mercury and one part zinc. The mercury in A is covered to the depth of one centimeter with a paste made of mercury, mercurous sulphate and crystals of zinc sulphate, moistened with a solution of zinc sulphate. The paste and amalgam are then covered with a layer of crystals of zinc sulphate about one centimeter thick. The whole vessel is then filled with a saturated solution of zinc sulphate. The action of this cell is uniform, and at a temperature ranging from 10° to 25° C., the potential difference, PD, can be found by the following formula: $PD = 1.434 \text{ volts } [1\text{-}0.000802 (t - 15°)]$. See ELECTRIC BATTERY.

Standard Oil Company, a corporation formed in 1870 by John D. and William Rockefeller, Samuel Andrews, Henry M. Flagler and Stephen V. Harkness. The capital stock of this company was $1,000,000, increased to $2,500,000 in 1872, and to $3,500,000 in 1874. It became the Standard Oil Trust in 1882, with a still greater capitalization and with subsidiary companies in every state. This, the first of American trusts, was dissolved by the courts in 1892, being held in violation of the Sherman Anti-Trust Law of 1890. It was, however, succeeded by the Standard Oil Company of New Jersey, with 36 subsidiary companies. This corporation, though repeatedly attacked, survived until 1911, when the Supreme Court ordered its dissolution under the Sherman Law. The Standard Oil Company of New Jersey had long exercised a practical monopoly of petroleum business in the United States, and in some other countries. Though the giant trust was again dissolved into its constituent parts, the control of the industry remains in the hands of a few men who hold a majority of the stock in each of the many smaller companies. So profitable was the oil business during the half century, that the Standard Oil interests have also, at different periods, been able to secure control of many allied industries, such as railroads and banks.

Stan'dish, Miles (1584-1656), an American colonist and soldier, born in Lancashire, England. As a lieutenant of the English army, he served in the Low Countries, aiding the Dutch against Spain. Later he attached himself to the Pilgrims, although not belonging to their congregation, and sailed with them in the *Mayflower* in 1620. His wife died during his first winter in Massachusetts. Longfellow, in *The Courtship of Miles Standish,* gives an account of the Captain's attempted wooing of Priscilla Mullins. In 1625 he went to England. Returning the following year, he settled at Duxbury, Mass., where he died and where today his statue honors his memory. Standish was captain of the military band and also served, for a long time, as treasurer of the Puritan colony.

Stand'pat'ter. See POLITICAL PARTIES IN THE UNITED STATES.

Stan'ford, Leland (1824-1893), an American capitalist and statesman, born in Watervliet, N. Y. He received a common school education, was admitted to the bar in 1849 and practiced at Port Washington, Wis., until his removal in 1852 to California, where he engaged in gold mining and the mercantile business. A promoter of the Central Pacific Railroad, he later became president of the company and superintended the construction of the line. He became governor of California in 1861 and was United States senator from 1884 until his death. With his wife, he founded at Palo Alto, Cal., the Leland Stanford Junior University, as a memorial to their only son. See LELAND STANFORD JUNIOR UNIVERSITY.

Stan'ley, Sir Henry Morton (1841-1904), an African explorer, born near Denbigh, Wales. Originally his name was John Rowlands, and, being left an orphan, he was placed in a poorhouse, which he left when still a youth, to become a school teacher. Finally, in 1857, he shipped as cabin boy to New Orleans, where he was employed and adopted by a merchant named Stanley. Young Stanley enlisted in the Confederate army at the beginning of the Civil War and was captured at the Battle of Shiloh, but escaped. After visiting Wales, he entered the United States navy as a volunteer, becoming ensign on the ironclad *Ticonderoga.* Following the war he went West as a newspaper correspondent, and while associated with the New York *Herald,* in 1868, joined the Abyssinian expedition as correspondent. Later he traveled in Spain and while there, in the fall of 1869, was commissioned by the proprietor of the New York *Herald* to find Dr. Livingstone. Having visited the Crimea, Palestine, Persia and India, he sailed from Bombay in October, 1870, for Zanzibar, where he arrived early the following January. In March, with 192 followers,

he set out for the interior of Africa, and on Nov. 10 he found Livingstone at Lake Tanganyika. Reporting to the British Association in August, 1872, he received the patron's medal of the Royal Geographical Society. During the Ashanti War, 1873, he was correspondent for the *Herald*.

Subsequently Stanley was commissioned by the London *Daily Telegraph* and by the New York *Herald* to explore the lake region of central Africa, setting out from the eastern coast in November, 1874. He reached the Victoria Nyanza the following February, circumnavigating it and covering some 1000 miles in the trip. Having explored the equatorial lake region, he entered the Congo River and, during a most perilous voyage, for the first time traveled that river from the interior to its mouth. In 1879, and under the auspices of the International African Association, which was founded by the King of the Belgians, he returned to develop this region, which in 1885 was established under the name of the Congo Free State.

In 1887 Stanley headed another African expedition to rescue Emin Pasha, who, following the Mahdist rising in the Sudan, was entrapped in the equatorial province of Egypt. This he effected by entering Africa on the west en route to the Congo, meeting Emin Pasha near Albert Nyanza and finally, in May, 1889, bringing him, with his Egyptian followers, to the coast. The next year he returned to England, and in 1895 he was elected to Parliament as a Liberal Unionist, working ardently to develop British interests in Africa. His chief publications are *How I Found Livingstone, Through the Dark Continent, In Darkest Africa* and *The Congo and the Founding of its Free State.*

Stan'nite, or **Tin Pyrites,** *Pi ri' teez,* a rare mineral consisting of tin, copper, iron sulphide and some zinc. It has a metallic luster, and when pure is iron-black, though often bronze-yellow. It commonly occurs as granular or compact and massive, occasionally as crystals. The chief source of stannite is Cornwall, England, where it is called "Bell Metal Ore." It is a valuable ore of both tin and copper.

Stanovoi, *Stah" no voi',* **Mountains,** a long system of mountain ranges of Siberia following the form of the coast from the Amur basin to Bering Strait. The Yablonoi Mountains at the west are sometimes considered a supplemental range. The slopes are generally heavily forested, but are overlooked by barren peaks and rugged rocks. The mountains are not of great height, about 8000 ft. being the altitude of the highest.

Stan'ton, Edwin McMasters (1814-1869), an American Statesman and jurist, born in Ohio. He was educated for the bar and practiced in his native state, also at Pittsburgh, and before the United States Supreme Court at Washington. From December, 1860, to March, 1861, he was attorney-general. In January, 1862, he was called to the head of the war department by President Lincoln, an office which he was eminently qualified to fill. In the controversy between President Andrew Johnson and the Republican Party, which arose after Lincoln's assassination, Stanton sided against the former, and Johnson demanded his resignation. Following the advice of the leading men of the Republican Party, Stanton refused to give up his office before the next meeting of Congress, whereupon the President suspended him. He was restored by the Senate in January, 1868. After President Johnson's impeachment and acquittal, Stanton resigned. He was later appointed associate justice of the United States Supreme Court.

Stanton, Elizabeth Cady (1815-1902), reformer and suffragist, born in Johnstown, N. Y. She studied in Johnstown Academy and completed her education under private teachers. She married Henry B. Stanton, a leading abolitionist, with whose views and work she was in most hearty sympathy. While Mrs. Stanton was in London attending the World's Anti-Slavery Convention, she met Lucretia Mott, a leading advocate of woman's rights, and became thorough-

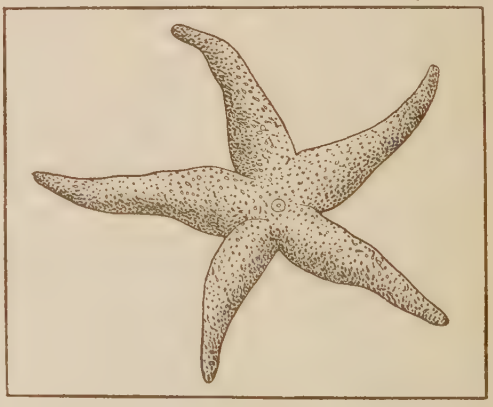
ly interested in the subject. When she returned to America in 1848, she issued a call for a woman's rights convention to be held at her home in Seneca Falls, N. Y. At that time there was formed the National Woman's Suffrage Association, of which Mrs. Stanton became president, continuing to hold the office until 1893. She formed a friendship with Susan B. Anthony, with whom she cooperated heartily until the close of her life. Mrs. Stanton was a woman of charming personality, a good writer and fluent speaker. She secured a national reputation as a lecturer, and held many prominent positions in different women's organizations. Among her books may be mentioned *History of Woman Suffrage* and *The Solitude of Self*.

Starch, a white granular substance produced by plants and stored in their roots, stems, leaves and seeds, from whence it is extracted and placed upon the market in the familiar commercial form. The entire chemical process by which plants produce starch is not fully understood, but it is known to be by an operation which takes place only in light and is much more rapid in direct sunlight. The leaves, by means of the tiny chlorophyll bodies, which give them their green color, are capable of taking up hydrogen, carbon and oxygen, and the first noticeable result is the production of tiny starch grains which may be seen in the leaves. These grains, known as assimilation starch, are never found there in large quantities, for at night or in artificial darkness they are dissolved. Starch grains which are produced abundantly and stored in seeds, pith or elsewhere are known as reserve starch and are found in tubers, as potatoes; in roots, as carrots and beets; in grains, as corn, rice and wheat; in bulbs, as onions; and in pith, as in the sago palm.

Commercial cornstarch is made by soaking the corn for 48 hours, then grinding and filtering; the resulting grains are allowed to settle and are bleached and dried. The production of starch from potatoes and rice differs only slightly. Tapioca, sago, arrowroot and cornstarch are forms of starch used as food. Other forms are used in the manufacture of calico, paste and glucose and for stiffening clothes in laundries. Cornstarch was first made in the United States in 1842, and the starch factories at Glen Cove, Long Island, and at Oswego, N. Y., are the largest in the world.

Star Chamber, a high English court of justice. Its name is supposed to have been given because the room in which the court sat at Westminster was decorated with gilt stars. In 1487 Henry VII reorganized the court, giving it the right to try sheriffs and juries for misdemeanors and sentence without a jury. This proved highly useful in restoring peace and order. It was used arbitrarily by Henry VIII and became odious as an instrument of torture and of royal tyranny under the Stuarts. It was abolished in 1641.

Star'fish", a family of sea animals belonging to the group Echinodermata. Representatives are found upon the



STARFISH

coasts of the United States, chiefly in the South and West. They have a thickened central portion upon the under surface of which the mouth is located and from which extend five pointed arms. The spiny skin contains a deposit of lime which renders it hard and somewhat shell-like if the fish is removed from the water for a great length of time; ordinarily, however, the arms of the starfish move with considerable

freedom and close about any object with great strength. Underneath the arms are the double rows of sucker feet which aid in locomotion.

The chief food of the starfish is the oyster, and its method of procuring the flesh is interesting. It slowly approaches the oyster, which upon the slightest hint of danger tightly closes its shell by means of a stout muscle fastened to the inner surface. The starfish, unable to pry open the shell, uses his only weapon —patience. He remains holding the shell until the muscles of the oyster relax through weariness, when the shell falls open and the soft parts lie exposed to the voracity of the enemy. Starfish are thus greatly dreaded by the oyster culturists, who must keep the beds free from these pests.

The circulatory, digestive, nervous and reproductive systems of the starfish are all well organized. The stomach extends to some distance into each of the arms and is the largest organ of the body. Several species of starfish are known and are locally called brittle stars, sand stars, five-fingered Jacks, sun stars and rose stars; the five-fingered Jack is the common starfish.

Stark, John (1728-1822), an American soldier, born at Londonderry, N. H. In 1752 he was captured by the St. Francis Indians, who held him for six weeks, when he was ransomed by Massachusetts. During the French and Indian War he served as lieutenant and captain, being active in the Battle of Lake George, the march against Ticonderoga and the Ticonderoga-Crown Point campaign. When the Revolution broke out he raised a regiment which he led as colonel to Cambridge. He displayed great bravery at Bunker Hill, fought in the Canadian expedition and was present at the battles of Trenton and Princeton. In March, 1777, he resigned from the army because Congress had failed to promote him; but a little later in the year he organized an independent corps of New Hampshire militiamen, with which he completely defeated two detachments of Burgoyne's army at Bennington, Aug. 16, 1777. For this he was commissioned brigadier-general. Stark took part in the operations about Saratoga and commanded the northern department in 1778 and in 1781.

Stark, who was one of the ablest officers of the war, pledged his personal fortune to pay the soldiers in 1776 so that they might be induced to serve longer, and he was one of the foremost leaders in raising recruits and supplies during the Revolution. See BENNINGTON, BATTLE OF.

Star'ling, a bird of the Starling Family. The English starling is about the size of the robin. It is black, with green and violet reflections and buff-colored spots. The nest is loosely made, and is placed in holes in cliffs or in crevices about buildings. Five to seven greenish-blue eggs are laid. After the nesting season the starlings, including young and old birds, congregate in flocks, estimated to contain as many as 100,000 birds. They resort at night to some favorite roosting place, upon which they descend like a gigantic cloud. The starling possesses a wide range of notes and calls, many of which resemble the songs of other birds. In captivity it has been taught to whistle and to imitate a few words. It is native in western Europe. In 1890, 60 of these birds were introduced into New York City, and they have remained in that vicinity, nesting and successfully passing through the winters.

Star-Nosed Mole, a member of the Mole Family of Insectivora found in marshy ground or in brooks and ponds. It has received its name from the circle of pink tentacles which terminate its snout. In other respects it resembles all moles, having the same plump, sleek body, strong forefeet, insignificant, half-concealed eyes and hairless tail. It is one of the commonest American moles, and is about five inches in length. The tentacles about the nose are constantly in motion and are no doubt of assistance to the strong foreclaws, as they dig their long tunnels and burrow in the soft loam

for frogs, worms and semiaquatic vegetation. See MOLE.

Star of Bethlehem, a delicate meadow herb of the Lily Family often found growing in the tall grass near sidewalks, or in dooryards which are not frequently mowed. Leaves and flower stalks both arise from a coated bulb and grow to the height of 10 or 12 inches. The leaves are narrow, much like those of the grass in which it grows. Near the flowers on the flower stalks, shorter and broader little leaves, called bracts, set off the whiteness of the blossoms. The flowers themselves are made up of six white, petal-like sepals, green on the outside and green-veined within, six stamens and a central, three-lobed pistil. When in full bloom the flowers are decidedly "starry" as they peer through the long, dark green grasses of early spring. The Star of Bethlehem is known from New England west to the Mississippi and as far south as Tennessee, but it is an escape from gardens to which it was originally brought from Italian fields.

Star of the West. See FORT SUMTER.

Starr, Frederick (1858-), an American anthropologist, born in Auburn, N. Y. He was educated at Lafayette College and became associated, in turn, with the science departments of Wyman Institute, the State Normal School of Lock Haven, Pa., and Coe College. Moreover, he had been connected with the American Museum of Natural History and with Chautauqua University before he became assistant professor, and later, in 1895, associate professor and curator of the anthropological section of the Walker Museum of the University of Chicago. He has done considerable field work in Mexico, the Philippines, Japan and Korea, secured from Japan, on behalf of the St. Louis Exposition, a group of aboriginal Ainu, and investigated conditions in 28 tribes of the Congo State. Professor Starr, who has received marked foreign recognition, has lectured extensively and is the author of *Some First Steps in Human Progress, American Indians, Strange Peoples, The Truth About the Congo, Indian Mexico, Filipino Riddles* and *Japanese Proverbs and Pictures.*

Stars, self-luminous bodies similar to the sun, which is itself a star. The stars are at such great distances from us that their relative positions do not seem to the ordinary observer to change; hence they are called fixed stars, but the delicate instruments of the astronomer show some of them to be in very rapid motion. The nearest star, *a* Centauri, is so far away that light traveling at the rate of 186,000 m. a second requires three and one-half years to reach us, and it is estimated that it requires 125 years for the light from those most distant to reach the earth. Bright as the sun is, some of the stars are larger and brighter. Sirius is 13 times the size of the sun and gives 40 times as much light. Stars can readily be distinguished from planets, because they twinkle, while the planets shine with a steady light. Stars vary in color, some being white, some red and some having a bluish tint.

The stars are classified according to their apparent size, as stars of the first magnitude, second magnitude and so on to the sixth magnitude, visible to the naked eye; and on to the 16th magnitude, visible through the telescope. Astronomers differ somewhat in making this classification, some giving 14, some 20 stars of the first magnitude, composed of the largest stars, like Sirius, Vega and Arcturus. There are from 34 to 48 stars of the second magnitude, like the Pole Star and the pointers in the Dipper. Of the third magnitude there are from 141 to 152 stars, of the fourth 313 to 327, of the fifth 854 to 959, of the sixth 2010 to 4424, making in all from 3391 to 5905 stars visible to the naked eye. Through the telescope many millions more appear.

Centuries ago the stars were grouped, and each group was named in accordance with its fancied resemblance to some object on the earth, or from some legend. These groups are called constellations, and their names have been retained as a matter of convenience. The constellations are themselves grouped as

northern; equatorial, or the constellations of the zodiac; and southern. Many of the individual stars also have their own names, as Sirius, Rigel, Aldebaran, Arcturus, etc., and all the stars of the constellations have some designation by which they may be known. The most usual method is to call the star of greatest magnitude in a constellation by the first letter of the Greek alphabet, Alpha (*a*), the star of the next lesser magnitude by the second letter, Beta (*b*), etc., as *a* Lyræ is the brightest star in the constellation Lyra, *b* Lyræ, the second star in Lyra, and so on. Catalogues of the stars have been made from the second century before Christ, when Hipparchus is supposed to have made the first one, containing 1022 stars. Modern catalogues contain hundreds of thousands.

Stars are not always of the same brightness, as Mira; some stars are temporary, wandering away out of sight of the most powerful telescope; some appear for the first time in history, blaze forth and go away. Such a star appeared in the autumn of 1572 in the constellation Cassiopeia. When first seen it was as bright as Sirius, finally attaining a splendor visible at midday. In less than a year it disappeared entirely. See ASTRONOMY; CONSTELLATIONS; MILKY WAY; DOUBLE AND MULTIPLE STARS; ALDEBARAN; ALGOL; ARCTURUS; SIRIUS.

Star Spangled Banner, The. See HYMNS, NATIONAL.

Starva'tion, or **Inanition,** *In" a nish' un,* the wasting away of the body, resulting in death, caused by want of food. In the absence of food the body feeds upon itself; the fatty tissues and blood are consumed to nourish the nervous tissues, and death finally results from absence of heat, which during life is produced by combustion or absorption of the fatty material. The length of time during which the average individual can exist without nourishment is from five to ten days, though persons have been known to live 23 days without food, and the period has been prolonged by conserving the body heat with proper covering, abstaining from all exercise or exertion and by drinking water. Animals that spend the winter in seclusion feed on the adipose tissue, or fat, stored up previous to their long sleep, the supply of nutriment being ample to furnish the slight energy required for respiration and heart action during hibernation.

State, Department of. This department was the first of the nine executive departments to be organized under the Federal Government. At its head is the secretary of state, who ranks first in importance in the president's cabinet. This department is the medium of communication between the Government of the United States and all foreign governments as well as with the governors of the several states. The department of state has charge of all foreign affairs, including the consular service.

To aid the secretary of state an assistant secretary was provided for in 1853; in 1866 a second assistant was created and in 1874 a third. Each of these assistants has charge of a particular branch of the department, and the business is distributed among seven bureaus; namely, diplomatic, consular, indexes and archives, accounts, rolls and library, foreign commerce, and appointments. The secretary of state also has charge of the negotiation of all treaties, publishes all resolutions of Congress and proclamations of the president and affixes the presidential seal to all documents. The salary of the secretary of state is $12,000; of the first assistant, $5000, and of the second and third assistants, $4500.

Stat'en Island, an island in Lower New York Bay, 5 m. s. w. of the southern extremity of Manhattan Island. It is 13 m. long and constitutes the borough of Richmond, of New York City. It is separated from New Jersey by two narrow channels, Staten Island Sound and Kill van Kull, and from Long Island by the Narrows.

States-General, an assembly of the representatives of a nation. Before the French Revolution a States-General was composed in France of delegates of the three estates: the nobility, the clergy and

the burghers. The first States-General was summoned by Philip the Fair in 1302. These assemblies had no power in making the laws and could only give their sanction to matters of general taxation. Louis XIII summoned a States-General in 1614, but he hastily dismissed it when the delegates showed too great an interest in the finances of the country. No other was summoned until 1789, when Louis XVI summoned a States-General to relieve the financial stress and to give a constitution to France. A short time after it assembled at the invitation of the delegates of the Third Estate, it was changed into a National Assembly (See FRENCH REVOLUTION).

The name States-General was also given to the representative body of the seven provinces of Netherlands which met at The Hague until the French conquest in 1795.

States' Rights, a term used generally in political science to denote those governmental rights which belong to the separate states of a federal union, there being a certain sphere of authority in which these individual states may act without interference from the general government. In the United States when the Union was formed under the Constitution of 1787 certain rights were reserved by the states for themselves. These rights the central government is by law bound to respect, and they can be reduced only by an amendment to the Federal Constitution. The rights of a state are said to be delegated when, as in Mexico and Brazil, the constitution is recreated by a central national authority which also makes the states. States' rights are not changed when independent states unite to delegate by a constitution certain powers to a central government, as in the case of the German Empire, Austria-Hungary, the United States and Switzerland.

History proves that states forming unions of this class are certain in after time to deny or assert that the sovereignty of the state is one of the rights reserved, according as the state belongs to a stronger or weaker faction. The evolution of states' rights as shown in the history of the United States is typical. The sphere of the state authority embraced most of the powers of government except those relating to the army, navy, foreign affairs, coinage and the tariff. Most of the states claimed at one time or another that sovereignty was one of the specific rights, and on this theory the Southern States acted in 1861. The Civil War destroyed all claims of state sovereignty. The field of states' rights has not increased, while the tendency towards centralization is shown by the increased power of the Federal Government.

Stat'ics. See DYNAMICS.

Stat'ute, a law enacted by a legislative body. In the United States, Congress and state Legislatures are the authorized lawmaking bodies for the nation and the states respectively. The charters of most large cities confer lawmaking powers on the city council, but the laws enacted by these bodies are known as city ordinances and are operative only within the city limits. In order to be valid a statute must be expressed according to the form required by the state and must conform to the constitutions of the state and of the United States. A statute can be amended or repealed at any time by the legislative body by which it was enacted.

Staubbach, *Stow' bak,* a waterfall in Switzerland in the Canton of Bern. It is formed by a small stream and is 980 ft. high. The water is changed to spray before reaching the bottom; hence the name, which means dust stream.

Staun'ton, Va., a city and the county seat of Augusta Co., about 135 m. n.w. of Richmond, on the Baltimore & Ohio, the Chesapeake & Ohio and other railroads. It occupies part of a plateau, about 1380 ft. above sea level, between the Blue Ridge and Allegheny mountains. The mountain slopes are arable and furnish pasturage. Manufacturing is engaged in; and organs, wagons, agricultural tools, flour, canned goods and overalls are the principal products. Foundries and machine shops are operated.

At Staunton are the Western State Hospital for the Insane, the Virginia School for the deaf and blind, Staunton Military Academy, the Mary Baldwin Seminary, Stuart Hall and Dunsmore Business College. Other notable features are the county courthouse and a hospital. Near the city are a United States National military cemetery and a Confederate cemetery, the latter containing a memorial monument. Staunton was the outgrowth of a settlement in the vicinity made in 1731. In 1745 a courthouse was built and the place was named in honor of the wife of the lieutenant-governor, Sir William Gooch, Staunton being her maiden name. The town was incorporated in 1761 and in 1870 was chartered as a city. A unique feature of the city's administration is the employment of a business manager (elected annually), whose duties are similar to those of the manager of a large corporation. Population in 1920, 10,617.

Stead, *Sted,* **William Thomas** (1849-1912), an English journalist, born at Embleton, Northumberland. His early education was limited. In 1871 he was appointed editor of the *Northern Echo* and retained the position for nine years, when he became assistant editor of the *Pall Mall Gazette.* He became its editor in 1883 and held the position until 1889, when he founded the *Review of Reviews.* The following year its American counterpart was started in the United States as the *American Review of Reviews.* Through these financial relations they have always been closely related in plan and purpose. When editor of the *Pall Mall Gazette* Mr. Stead introduced American methods into London journalism, gathered around him a company of brilliant young men and made the *Gazette* the most readable paper in London. A staunch reformer and one who always had at heart the welfare of the common people, Mr. Stead often severely criticized the government, yet he is credited with securing the reconstruction of the British navy and the enactment of laws which secured permanent social reforms. He espoused the cause of the Boers in the Boer War and made a number of bitter attacks upon the government, which led to his retirement from the *Gazette.* Mr. Stead visited the United States in 1893 and in 1907. He was on his third trip to this country when he lost his life in the wreck of the *Titanic.*

Steam, *Steem,* the gaseous form of water, especially the gas into which water is changed by boiling. Steam is a transparent, colorless gas when the water has been completely vaporized, but is a wet vapor, called saturated steam, when part of the water is held in suspension. Water gives off vapor without being heated or by evaporation, but the term *steam* is limited in its application to the vapor given off during the process of boiling. Steam is lighter than air, and a cubic inch of water will make nearly a cubic foot of steam. While the steam shows by the thermometer the same temperature as the water, yet it contains more heat, and the steam escaping from a boiling kettle will burn more severely than the water in the kettle. This additional heat is called latent heat, and is given up again when the steam is condensed.

The temperature of 212° F. is practically constant when the vessel containing the water is left open to the atmosphere, but when in closed vessels, like steam boilers, the boiling point is raised with the increase of pressure. The temperature does not increase in equal proportion to the pressure; for instance, at the boiling point, 212° F., there is a pressure of one atmosphere, and it becomes two atmospheres at 301°, and 20 atmospheres at 444°, reckoning an atmosphere at a pressure of nearly 15 lb. The heat is the power in steam that is converted into work. When steam is carried away from a boiler and heated in a separate vessel containing no water, it becomes superheated steam, and acts like a perfect gas. It conveys but little sensible heat on escaping into the atmosphere, for it contains no aqueous vapor.

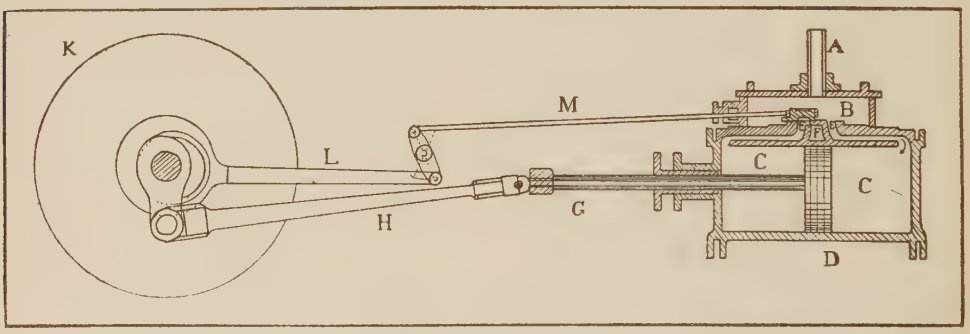
The most important service of steam is in the production of mechanical work through the different forms of steam en-

gines, for heating buildings and in the manufacture of glue and other commodities, in cooking and in meat-packing establishments. See STEAM ENGINE; HEAT.

Steam'boat". See STEAMSHIP.

Steam Engine, a machine for using the expansive force of steam as a motive power.

PARTS. The essential and working parts of a steam engine are its cylinder with valve and piston, connecting rod, eccentric and flywheel, together with the necessary appliances and devices for connecting them with the shaft. The cylinder is a cylindrical iron casting, whose inner surface has been carefully bored



STEAM ENGINE

out, and upon one side of which is fitted a box called the steam chest, B in the drawing, and from this, openings called steam ports lead into the cylinder, one at each end. Steam is admitted through the pipe (A) to the steam chest (B), from which it passes to the cylinder (C), through the steam ports (E) (E), first entering one end of the cylinder and pushing the piston (D) to the opposite end, when it escapes through the exhaust port (F). The piston rod (G) is joined by the connecting rod (H) to the crank, which changes the sliding action of the piston to a rotary motion in the wheel (K). The eccentric (L) is connected by the rod (M) with a sliding valve in the steam chest, which alternately opens and closes the steam ports (E) (E) and opens the exhaust port (F). This valve moves in the opposite direction to the piston and admits the steam to each end of the cylinder, as it is needed to push the piston back to the opposite end.

The shaft runs in bearings or journal boxes, which are provided with suitable oiling arrangements, and on the shaft is usually a flywheel to give steadiness of motion, while a governor regulates the speed. To control the flow of steam a throttle valve is fitted on the steam chest or to a pipe, and to oil the cylinder and valve, a lubricator is employed which mixes the oil with the steam as used.

CLASSIFICATION. Engines are usually classified as follows: (1) according to the position of the cylinder; (2) as to their manner of using steam; (3) in relation to the work for which the engine is designed; and (4) the character of the valve used to admit and release the steam. A vertical engine is one having the cylinder in an upright position either below the main shaft or above it. A horizontal engine has the cylinder in a horizontal plane, and this is the most common arrangement. Sometimes where an engine has two cylinders compounded, one may be vertical and the other horizontal. According to the method of using steam, engines are known as condensing and noncondensing; simple when one cylinder is used, compound when two, triple when three, quadruple when four and quintuple when five cylinders are used. A condensing engine is one in which the exhaust steam is condensed either by a

pump pumping water into the condenser or by means of a siphon, and in which the condensed steam is returned to the boiler in the form of hot water.

The compound engine uses the steam successively in two or more cylinders before it is allowed to escape, while a simple engine uses but one cylinder. Triple and quadruple engines are the most common form of marine engines, while the compound and simple are most generally used on land and known as stationary engines (See LOCOMOTIVE; TRACTION ENGINE). A slide valve or throttling engine is the simplest form of engine, while a Corliss-valve engine and the automatic cut-off engine, fitted usually with a piston valve, are made to use steam expansively, and employ special forms of governing devices for this purpose. See GOVERNOR; STEAM TURBINE.

HISTORY. The first device known for using steam as a motive power was invented by Hero of Alexandria about 130 B. C. It consisted of a hollow metallic ball, mounted on horizontal hollow trunnions upon which it revolved and through which steam was supplied. Hollow arms were attached to the ball, as spokes of a wheel are attached to the hub. At its outer end, each arm had a small opening on the side. These openings all faced the same way, and when steam was let into the ball, it escaped with considerable force through them. The reactions of the steam against the air caused the ball to revolve on the trunnions, just as the pressure of water causes a lawn sprinkler to rotate.

Hero's apparatus could not have been more than a curiosity, and it was nearly 2000 years before any practical use was made of the power of steam. In 1698 a crude engine was used for raising water, and, in 1705, the piston was brought into use. In the first type of engines, the valves for admitting steam to the cylinder and letting it out were operated by hand. Automatic attachments were finally invented, and these led to the eccentric (See ECCENTRIC). To James Watt, an instrument maker of the University of Glasgow, is due the credit of so improving the steam engine as to make it adaptable to the many purposes for which it is employed (See WATT, JAMES). Watt's improvements were so important that he is often considered the inventor of the steam engine. From Watt's day to the present, the development of the steam engine has consisted in perfecting the mechanism and the multiplication of designs to adapt the engine to various kinds of work. Since the introduction of electricity for lighting and power, the steam engine has undergone radical changes to adapt it to the high speed necessary to the operation of dynamos.

Steam Hammer, a machine tool consisting of a frame carrying a steam cylinder with its piston, a piston rod attached to a hammer, and an anvil or bed, and operated by steam. The earlier patterns were made single acting, admitting steam into the lower end of the cylinder under the piston and simply lifting the hammer and letting it fall, depending upon its weight to strike the blow. Later patterns are made double acting, admitting steam alternately to both sides of the piston. They operate not only much more rapidly, but the blow can be regulated to such a nicety that it will only crack an eggshell, or made so strong as to work large forgings. At the Krupp works in Essen, Germany, a steam hammer weighing over 50 tons was built. The Bethlehem Steel Works at Bethlehem, Pa., built one in 1889, which was at that time the largest ever built and whose piston and rod with the hammer weighed 125 tons. The cylinder was 76 inches in diameter and the length of stroke 16½ ft. Large hammers have been superseded by hydraulic presses, while small ones have been generally replaced by those of the trip-hammer type operated by belts and pulleys. See HYDROSTATIC PRESS.

Steam'ship". The invention of the steamboat is generally accredited to Robert Fulton, not because he was the first to attempt to propel a boat by steam power, but because he was the first inventor who was successful in applying steam power to navigation, which he did

by the construction of the *Clermont* in 1807. The *Clermont* made her first voyage on the Hudson river from New York to Albany, Aug. 7, 1807, an epoch-making date in the history of transportation. Previous to this several steamboats had been constructed, one by John Howell of England, who obtained a patent in 1736; another by John Fitch, an American who constructed a boat propelled by paddles operated by a steam engine. For some time one of Fitch's boats made regular trips on the Delaware River, but its mechanism was too complicated to be practical. The success of the *Clermont* led to the construction of other steamers. In 1812 they were placed on the Ohio River, and in 1818 the *Walk-in-the-Water* was placed on the Great Lakes. The first steamboat in Europe was the *Comet,* which appeared on the Clyde in Scotland in 1812. The first steamer to cross the Atlantic was the *Savannah* in 1819. It used both steam and sails and required 25 days to make the voyage.

At first all steamers were propelled by paddle wheels, but about 1839 John Ericsson perfected the screw propeller, which was much better adapted to ocean navigation. Following the introduction of the propeller came iron and steel as substitutes for wood in the construction of vessels. These improvements led to the rapid increase in the size of steamships, which began to replace the sailing vessels of the packet lines. Yet these steamers were smaller than many of the steam pleasure yachts of the present day. The first ship to astonish the world by its size was the *Great Eastern*, built in 1858. This ship was 688 ft. long, 83 ft. wide and 48 ft. deep and had a displacement of 32,160 tons. She was driven by both paddle wheels and propellers. Although much smaller than many ocean liners of today the *Great Eastern* was half a century in advance of her time and was commercially a failure, though she rendered excellent service in laying the Atlantic cable. See CABLE, SUBMARINE.

The forerunner of the modern ocean liner was the *China,* built in 1862. Though only 337 ft. long, being 50 ft. shorter than some of the large passenger steamships now plying on the Great Lakes, she set the pattern for the larger ships which followed.

THE MODERN STEAMSHIP. The finest steamships in the world ply between the ports of Europe and those of the United States and Canada. The most modern of them are floating palaces with all the conveniences and luxuries afforded by the best hotels. These ships vary in size, being 300 ft. to over 900 ft. in length, with proportionate dimensions for beam and height. The fastest ships require from five to six days to make the voyage between New York and Liverpool. Four of these ships because of their size and magnificence demand special attention. They are the *Lusitania* and *Mauritania* of the Cunard Line; the *Olympic* of the White Star Line; and the *Imperator* of the Hamburg-American Line. The *Lusitania* and *Mauritania* are each 790 ft. long, 88 ft. beam and have a register of 45,000 tons. On May 7, 1915, the *Lusitania,* with 2104 passengers on board, was torpedoed and sunk in St. George's Channel by a German submarine. The *Olympic* is 882½ ft. long, 92½ ft. beam and 45,324 tons register.

The *Imperator* is 919 ft. long, 98 ft. beam and is 62 ft. deep. Her length is more than twice the height of the Great Pyramid of Egypt; exceeds the height of the Washington Monument by 364 ft. and that of the Woolworth Building in New York, the tallest building in the world, by 169 ft. Her boat deck is 100 ft. above the keel. The funnels are oval and have diameters of 29 ft. and 18 ft. respectively and are 69 ft. long. Were one of these funnels laid on its side two railroad trains could pass through it abreast on a double track. The rudder weighs 90 tons, and the ship has a displacement of 70,000 tons, with a carrying capacity of 50,000 tons. The keel has two walls, each water-tight, so that it is practically two ships, one within the other. It is driven by four propellers operated by turbine engines whose total capacity is 72,000-horsepower, one engine alone having 22,000-horsepower. Her

average speed is 22½ knots per hour. The operation of the ship and care of the passengers require a crew of 1100, and there are, all told, accommodations for about 4000 passengers. In a single voyage across the Atlantic, this ship consumes over 7000 tons of coal. For safety the ship is divided by bulkheads into 36 water-tight compartments, each with automatic doors, which can be closed from the navigating bridge.

The furnishings are luxurious. Besides state rooms, dining rooms and sitting rooms or saloons, there are plunge and shower baths, a swimming pool, a running track, a gymnasium and rooms for athletic games. The ship is arranged for first-, second- and third-class and steerage passengers.

Many steamers carry both passengers and freight, and if one is not pressed for time these boats afford a very desirable means of travel. Their accommodations include all that is necessary for the comfort of their passengers, and while they require a longer time for the voyage, the fare is much lower than on exclusively passenger ships.

The steamships on the Great Lakes differ from ocean-going vessels only in size. Some are for passenger service only; some are for both passengers and freight; and others are exclusively for freight. The transportation of iron ore on these lakes has developed a peculiar type of ship found nowhere else. It is long, narrow and low, and travels at about the same rate as the best passenger ships. See TRAVEL AND TRANSPORTATION; STEAM TURBINE.

Steam Shovel, a machine for excavating on dry land. It consists of a hoisting engine and a swinging crane provided with a thrusting scoop or shovel whose bottom is hinged and held in place by a spring latch. The entire apparatus is usually mounted on a car. When in use the shovel is lowered and thrust forward into the material, then hoisted and swung around over to the point where it is to be emptied. When a cord attached to the latch is pulled, the bottom opens, allowing the material to fall out of the shovel. Steam shovels are made in different sizes, ranging in capacity from one-half cubic yard to five cubic yards, this being governed by the size of the scoop, with engines and other parts built in proportion. Steam shovels are extensively employed in making cuts on railways, in digging clay for brickyards and in excavating ore in the iron mines of the Lake Superior region. Those used on the Panama Canal are among the largest ever built. See DREDGER.

Steam Turbine, *Tur' bin,* a form of steam engine in which the revolving motion is obtained by the impact of a jet of steam on the blades, or vanes, of a wheel. There are a number of patterns, some made for high-pressure steam and others for low pressure, and they are built to work both horizontally and vertically. In size they range from 20-horsepower up to several thousand horsepower. In the De Laval turbine several jets of steam at a very high pressure strike a series of openings in a wheel, similar in form to the buckets of a Pelton water wheel, while in the Parson's turbine the steam is made to give impulses to a series of wheels fixed on the same shaft before it escapes into the atmosphere or into a condenser.

The speed of a turbine is very high, that of a 150-horsepower Parson being 4800 revolutions per minute, and a 50-horsepower De Laval has been made to rotate as rapidly as 15,000 revolutions per minute. With these high speeds it is generally necessary to use reducing gearing when driving machinery. However, this high speed is especially suited to the operation of electrical generators, and large turbines are very generally replacing the old-style steam engine for operating these generators. Turbines are not subject to the same internal condensation of steam as other engines, and their economy in fuel consumption is also greater. They weigh less for the same power and they take up less space. For these reasons they are being used for propelling steamships in both the merchant-marine service and in the navy. An experimental boat, the *Turbinia,* 100 ft.

long, using three turbines aggregating 2000-horsepower, made 34½ knots an hour. The *Olympic,* one of the largest steamships ever built, has turbines amounting to 75,000-horsepower to drive her propellers, and there is little vibration felt by the passengers. See STEAM ENGINE.

Steam Whistle, a device attached to a steam boiler and used for signaling or sounding warnings. It consists of an upright cylinder of thin brass or copper, open at the lower end and closed at the top, forming the bell, which is supported on a rod; also of a casting provided with a circular slot and a valve provided with a lever for opening and a spring for closing it. The steam whistle is employed on locomotives and steamboats for signals and to warn the public of their approach. In factories it is used to call the workmen, to indicate the hour for closing, and for fire alarms. The tone of the whistle depends upon the size and shape of the bell, a small, slender bell producing a high tone, and a large bell, a low tone, well illustrated by the whistles on steamboats. When very large these are called sirens.

Stearic, *Ste air' ik,* **Acid,** one of the fatty acids produced from mutton suet and other fats containing stearin (See STEARIN). It is without taste or odor and is insoluble in water but is soluble in alcohol. It combines with numerous substances, such as alkalies and metallic oxides, forming acid and neutral salts called stearates. It is found in combination with glycerin. It is employed in the manufacture of candles and burns like wax.

Stearin, *Ste' a rin,* the principal constituent of fats and produced from them by decomposition through the use of alkalies. It is also obtained from mutton suet by repeated washings in ether and by crystallization. It is soluble in alcohol and ether and insoluble in water. Stearin is white with a pearly luster, and when melted resembles wax. It is employed chiefly in the production of soap and glycerin. See STEARIC ACID; GLYCERIN; SOAP.

Steck'el, Louis Joseph René (1844-), a Canadian civil engineer, born in Alsace and educated at Laval University. He came permanently to Canada in 1860 and was first employed as a draughtsman by the Canadian Department of Public Works, serving on the Gaspé and Gulf of St. Lawrence shore road surveys. Later he was draughtsman during the construction of the Parliament and Departmental buildings in Ottawa, and following 1869, when he made permanent connections with the engineering branch of the Dominion Public Works Department, he served on the surveys made on the Isthmus of Chignecto and on several lines for the proposed Soulanges Canal, and surveyed the River St. Charles estuary, Quebec, in connection with projected harbor improvements. In 1880 he was appointed chief clerk, and he since has carried on hydrographic surveys along part of the River St. Lawrence Ship Canal, has established in some of the provinces and territories precise levels and permanent bench marks and has founded a system of Canadian geodetic levels along the Richelieu and the St. Lawrence.

Sted'man, Edmund Clarence (1833-1908), an American poet, critic and essayist, born in Hartford, Conn. He was editor of the Norwich *Tribune* and of the Winsted *Herald* and later was on the staff of the New York *Tribune.* From the beginning of the Civil War until 1863 he was war correspondent for the New York *World.* He studied law, was private secretary to Attorney-General Bates in Washington, financiered the first Pacific railroad in 1864 and was a member of the New York Stock Exchange from 1869 to 1900. His critical works are characterized by discrimination and insight; his poetry, by a lyric tone and an idyllic atmosphere. With Ellen M. Hutchinson he edited *A Library of American Literature* and with George E. Woodberry the *Works of Edgar Allen Poe.* He compiled *A Victorian Anthology* and *An American Anthology.* Previous to this he had published in *Scribner's Monthly* a critical

study of American poetry during the 19th century and of English poetry since 1837. This work, together with his treatise on *The Nature and Elements of Poetry,* appeared in the volumes, *The Victorian Poets* and *The Poets of America,* and represented the best critical work then published in the United States. Among his volumes of verse are *Poems, Lyrical and Idyllic, Alice of Monmouth, The Blameless Prince, Hawthorne and Other Poems* and *Poems Now First Collected.*

Steel. See IRON AND STEEL.

Steele, Sir Richard (1672-1729), an English man of letters and politician, born in Dublin. He studied at the Charterhouse School and at Oxford and was in the army for ten years, seeing perhaps no active service, but rising to the rank of captain. After writing *The Christian Hero,* a religious essay, he followed it with the three comedies, *The Funeral, The Lying Lover* and *The Tender Husband.* In 1709 he established the Whig tri-weekly, the *Tatler,* with himself as editor, writing under the name of Isaac Bickerstaff. It gave way to the *Spectator* in 1711, a joint venture of Steele and Addison, the *Guardian* and other short-lived periodicals. He was twice elected to Parliament and was knighted in 1715. His best comedy, *The Conscious Lovers,* appeared in 1722.

Steele was generous, whole-souled and tender-hearted. Though he was a gay man about town and much of a spendthrift, he indulged in no dark vices, and was loved even by his political enemies. His poetry gained for him no distinction. In his comedies he attempted to elevate the morals of the stage, substituting sentimentality, wit and gayety for coarseness and licentiousness. But his more enduring reputation rests upon the literary work that he published in connection with Addison. Although his essays suffer upon comparison with the superior humor and taste that Addison's essays reveal, still something must be made of the fact that Steele was the precursor, and as such became the father of the essay or sketch whose theme is contemporary life and manners. See ADDISON, JOSEPH.

Steele, Samuel Benfield (1849-), a Canadian soldier, born in Ontario. In 1866 he was appointed an ensign, serving during the Fenian Raid and on the Red River Expedition, and in 1873 he became troop sergeant-major of the Royal Northwest Mounted Police, of which he was made superintendent in 1885. He was commissioner of police and of the peace during the construction of the Canadian Pacific through the Rockies, and rendered effective service during the Northwest Campaign, 1885, in the expedition into Kootenay, British Columbia, during the miners' rush into the Klondike, during the organization of the Yukon Territory and in the South African War. Subsequently Colonel Steele took part in the operations in East and West Transvaal.

Steel'ton, Pa., a city of Dauphin Co., 3 m. s.e. of Harrisburg, on the Susquehanna River, the Pennsylvania Canal and the Philadelphia & Reading and the Pennsylvania railroads. The chief industrial establishments of the town are owned by the Pennsylvania Steel Company, which has vast bridge and construction works, blast furnaces and rolling mills. Other establishments are shirt and hose factories, brickyards, lumber mills, etc. An electric line connects the town with Harrisburg. The place was laid out under the name of Baldwin in 1866; the name was subsequently changed to Steel Works, P. O., and in 1880 it was incorporated under its present name. Population in 1920, 13,428.

Steel'yard", a device for weighing. It consists of a lever (See LEVER) divided into two arms; the shorter one carrying the fulcrum has a pivot near its end on which is suspended either a hook or a scale pan to hold the articles to be weighed. Towards the long end of the lever is fixed a pair of trunnions, by which the steelyard is held up, forming the fulcrum of the lever. The long arm of the lever is graduated so that a movable weight or poise, hung by a hook into its notched edge, will indicate the weight

of an article placed in the scale pan when the two ends of the lever balance or keep in equilibrium in a horizontal position. See WEIGHING MACHINES.

Steen, *Stane,* **Jan** (about 1626-1679), a celebrated Dutch subject painter, born at Leyden. The accounts of his life are conflicting, but he is known to have worked at Haarlem from 1661 to 1669, the most brilliant period of his career. His works, of which there are about 500, are distinguished for accurate draughtsmanship, clear, transparent color and keen humor. He ranks with Hogarth as a pictorial satirist, and surpasses all other Dutch figure painters, except Rembrandt, in the variety and range of his subjects and in dramatic power. Remarkably fine examples of his work are the *Music Master,* in the National Gallery, London; *Grace Before Meat; The Menagerie; Lovesick,* Amsterdam Gallery; and *The Marriage Contract,* Brunswick Museum.

Stein, *Shtine,* **Heinrich Friedrich Karl,** BARON VOM (1757-1831), a Prussian statesman, born at Nassau and educated at Göttingen. After entering the Prussian civil service, he became head of the Westphalia Department of Mines, and in 1786 visited England to make a study of her institutions. In 1804, as chief of indirect imposts, taxes, manufactures and commerce, he introduced various reforms in his department; he was dismissed in 1807, but later recalled. The Napoleonic wars opened his eyes to the necessity of developing the internal resources of Prussia, and he entered upon a series of administrative and political reforms which included the abolition of serfdom, promotion in the State service by merit alone, and the establishment of a modern municipal system. At the same time the Prussian army was being organized. Although Napoleon compelled Stein to retire in November, 1808, his work was continued by Hardenberg (See HARDENBERG, KARL AUGUST). Prussia, regenerated morally and politically, became the leader of the German states in the War of Liberation, and after the Battle of Leipsic in 1813, Stein became head of the council for the administration of the reconquered German territory. After his retirement from political life he devoted himself to the promotion of German art and science.

Steinbok, *Stine' bok".* See IBEX.

Steiner, *Sti" ner,* **Edward Alfred** (1866-), a sociologist, born in Vienna and educated in the public schools of Vienna and the universities of Heidelberg, Göttingen and Berlin. He came to the United States and studied for the ministry at Oberlin College, becoming a minister in the Congregational Church. He held pastorates in St. Cloud and St. Paul, Minn., and Springfield and Sandusky, Ohio. In 1903 he went as special representative of *The Outlook* to Russia, and the same year was appointed professor of applied Christianity in Iowa College, now Grinnell College. Professor Steiner has made a special study of the immigrant problem and is considered one of the best authorities on the subject in America. He is widely known as a lecturer, and is the author of *Tolstoy the Man, On the Trail of the Immigrant, Against the Current* and *The Broken Wall.*

Stem, or ascending axis, the part of a plant which serves to connect the roots and leaves and also to lift the leaves to sunlight and air.

Stems are classified according to their method of growth as erect, creeping, climbing, twining, diffuse or prostrate. In some plants the leafstalks and flower stalks spring directly from the root, and such plants are said to be stemless. Still other plants have their stems continued below ground, and these are distinguished from roots by their having unprotected growing points and rudiments of leaves, leaf bearing being a function only of stems. Bulbs, as of the tulip; rootstocks, as of the peppermint; and tubers, as of the potato, are typical underground stems, each being a storehouse of food material for the plant.

Stems have two principal forms of structure: that which is familiar in trees and shrubs and is formed by an external growth of the stem; and that found in

lilies, palms and such plants, which have the oldest part of the stem at the outside. The first class is called dicotyledonous, and the second, monocotyledonous, signifying the character of the seeds from which they spring. See SEED.

Stems are arboreous, shrubby or herbaceous according as they are trees, shrubs or herbs.

Stencil, *Sten' sil,* a thin plate of metal, cardboard or other material used for tracing letters, drawings or ornamental designs. The figures are cut in the stencil which is placed upon a surface to be marked, and a brush previously filled with coloring matter is rubbed over the stencil. Designs can be quickly and cheaply reproduced by this means. Stencils are used in marking barrels, boxes, etc., containing merchandise, and for making outlines in ornamental work.

Stephen, *Ste' ven,* a character of the New Testament, the first martyr to the Christian Gospel. He was one of the seven men appointed by the early Church at Jerusalem to serve as deacons, their special duty being to look after the distribution of alms. Stephen is recorded in *Acts vi* as being "full of faith and the Holy Ghost," and his zeal and success so stirred up the Jews that he was summoned before the Sanhedrin on the charge of blasphemy. After the semblance of a trial he was cast out of the city and stoned to death. An interesting feature of his execution was the presence there of a young man named Saul, who later, as the Apostle Paul, became the greatest missionary of the time.

Stephen, Sir Leslie (1832-1904), an English biographer and critic, born in London. He graduated at Cambridge and in 1864 went to London to engage in literary work. In 1871 he became editor of the *Cornhill Magazine,* but resigned in 1882 to undertake the work of editing the *Dictionary of National Biography.* He was the first Clark lecturer at Cambridge in 1883 and was knighted in 1902. His work lay along the lines not only of biography, but of philosophy and ethics as well. In all his writings, humor, satire, subtlety and saneness are prevailing characteristics. His works include *Hours in a Library, The History of English Thought in the Eighteenth Century, Essays on Freethinking and Plain Speaking, The Science of Ethics, Studies of a Biographer, The English Utilitarians* and the lives of Swift, Johnson, Pope, Hobbes and George Eliot in the English Men of Letters series.

Stephens, *Ste' venz,* Alexander Hamilton (1812-1883), an American statesman, born near Crawfordsville, Ga., and educated at Franklin College. Having been left an orphan and his childhood having been spent in dire poverty, he was indebted to friends for his education. Later, however, he repaid all benefactors with interest. In 1834 he was admitted to the bar, began to practice law at Crawfordsville and soon rose to eminence. In 1836 he was elected to the Georgia Legislature, where he remained until 1841, in 1842 he was state senator and from 1843 to 1859 he was a representative in Congress. An able debater, he here attained prominence in advocating the doctrine of state sovereignty. Meanwhile he favored the annexation of Texas, supported Clay for the presidency, was active in bringing about the compromises of 1850 and supported the Kansas-Nebraska Bill.

When Georgia debated passing an ordinance of secession, Stephens opposed the scheme; but when it was adopted by a majority at a state convention, as he himself said, he bowed to the will of the people of his state. He had opposed secession merely as inexpedient, and he felt it his duty to accept the vice-presidency of the Confederacy. Following the war, Stephens was held for sometime as a prisoner at Ft. Warren in Boston Harbor; but previously he had been head of the Confederate peace commission which met at Hampton Roads early in 1865. In 1866 he was elected United States senator but was denied his seat; however, he entered Congress in 1873, where he remained until 1882, when he became governor of Georgia. In eulogizing Stephens, Robert Toombs said: "He

was not always successful, but he had a will that dared to do right, to follow his convictions even in spite of his constituents."

Ste'phenson, George (1781-1848), an English engineer, born at Wylam. He spent his boyhood on a farm and in assisting his father, who was fireman in a colliery. Here he showed a remarkable aptitude for mechanics and gained rapid advancement. His school education was limited, but while a youth he acquired a thorough practical knowledge of steam engines and pumping machinery. He served as engineer in several places, and in 1815 invented a safety lamp similar to that for which Sir Humphry Davy was awarded a patent. See SAFETY LAMP.

Stephenson's greatest work was connected with the construction of railways and the perfection of the locomotive. In 1821 he became chief engineer of the Stockton & Darlington Railway, and three years later he was appointed engineer of the Liverpool & Manchester Railway. On this railway in 1829 his *Rocket* won the competitive trial of locomotives, and its success was such as to assure the construction of steam railways throughout England and the continents of Europe and America. Stephenson soon became the consulting engineer of all the railway projects in England. In 1846 he visited the Continent, where he was received with the highest honors. His last years were spent on his farm at Tapton House. He ranks as one of the greatest mechanical engineers of the 19th century.

Steppes, *Steps,* the name generally applied to the undulating plains in the southeastern part of European Russia and extending into western Asia around the Caspian and Aral seas and northward into Siberia. They correspond to the prairies and pampas of America, except that during the dry season they are barren, but in the spring they are covered with grass and flowers.

Stereopticon, *Ster" e op' ti kon,* an instrument containing a number of lenses and used for projecting upon a screen a highly magnified image of a transparent picture. The common stereopticon consists of five essentials: a source of light, like a candle, to illuminate the picture which is to be magnified; a lens to collect this light and train it upon the picture, called the condensing lens or condenser; a slide containing the picture, on glass so as to be transparent; a lens called the projecting lens, or objective, which magnifies the picture and projects it on the screen, which should be white. Originally candles were the source of light, but they have been superseded, as the stronger and more concentrated the light, the clearer the picture produced. Lime light, made by heating a piece of lime white-hot in a flame of hydrogen or illuminating gas, into which a jet of oxygen has been injected, is commonly used where an electric current cannot be obtained. The electric arc light, however, is the most satisfactory, and is generally used in buildings lighted by electricity. Each sort of light requires its peculiar burner, and a lantern fitted for lime light cannot be used with electricity without changing burners.

The condensing lens is usually composed of two single plano-convex lenses, with their spherical faces opposite each other, and as this lens is used only to throw light on the slide containing the picture, it can be a low grade or inexpensive lens. The slide should contain a picture having clear, sharp, well-defined lines, and if it is colored it produces a more pleasing effect. The projecting lens should be of a high grade, since the quality of the picture largely depends on this, and it should be so mounted that the focus can be readily adjusted; otherwise a clear picture cannot be secured.

Originally the projecting lantern was employed by magicians, from which fact it obtained the name *magic lantern,* but now it is used extensively by public lecturers, in schools and colleges in teaching geography and history, and for scientific purposes. It has been brought to a high degree of perfection, and has numerous attachments for producing pleasing effects. See MOVING PICTURES.

Stereoscope, *Ster' e o skope",* an optical instrument which combines or makes two different pictures of the same object appear to the eye as one, at the same time magnifying the picture. Two photographs of the object are taken, one as it appears to the right eye and one as it looks to the left eye. These are transposed and mounted on cardboard and inserted in an instrument having a double-convex lens cut in two. In looking through these lenses, the two images blend into one, just as seen by the eyes alone and greatly magnified. A reflecting stereoscope was invented by Wheatstone in 1838; afterwards Brewster brought out the present instrument, which is based on the refractive properties of the halves of double-convex lenses. See LENS.

Ster'eotype", the name given to a plate made from a mold in exact duplication of type, which is used in printing instead of the type. Formerly the mold was made of plaster of Paris dried and baked, and called a matrix. Genoux, a Frenchman, in 1829 invented the papier-mâché process, which not only is much cheaper but quicker. The type is set and the form locked; afterwards the face of the type is brushed and oiled. Folds of soft paper are dampened, and after being laid on the type they are forced into every crevice by a stiff brush or mallet, so as to get the full impression of the type. This paper is then thoroughly dried and used as a mold in which the melted type metal is poured. Ordinary printing presses use flat plates, but newspapers generally employ cylinder presses requiring cylindrical plates which are usually made in sections. See PRINTING; ELECTROPLATING.

Ster'ling, Ill., a city of Whiteside Co., 50 m. n.e. of Rock Island and 109 m. w. of Chicago, on Rock River and on the Chicago, Burlington & Quincy, the Chicago & North Western and other railroads. In the midst of an agricultural district and with good water power, the town is of considerable importance as a manufacturing and commercial center. Its manufactories include gas-engine works, machine shops, foundries, pump, wagon, wire and tool factories, hardware and silver-plating works, canning establishments, flour mills and casket and hearse factories. The town contains numerous prominent public buildings, schools and churches, an opera house, a business school and a public library. The first settlement on the site of Sterling was made in 1834 by Hezekiah Brink. In 1839 the present town was formed by consolidation of two settlements named Harrisburg and Chatham, and it was incorporated in 1857; it received its charter in 1872. Population in 1920, U. S. census, 8182.

Stern'berg, George Miller (1838-1915), an American surgeon and student of bacteriology, born in Otsego County, N. Y. He was educated at Columbia and in 1861 entered the United States army as assistant surgeon, retiring in 1902 with the rank of brigadier-general surgeon-general. He directed medical affairs during the Spanish-American War, practically relieving Cuba from yellow fever. Among his books are *Bacteria; Malaria and Malarial Diseases;* and *Immunity, Protective Inoculations, and Serum-Therapy.*

Sternburg, *Stern' boorg,* **Hermann Speck von,** BARON (1852-1908), a German diplomat, born in Leeds, England, and educated in Saxony and the military academy and at Potsdam. He served in the German army during the Franco-German War. In 1890 he was made secretary of the legation at Peking. After occupying several important positions he was appointed minister-plenipotentiary and envoy-extraordinary to the United States, and in 1903 became the regular ambassador to this country.

Sterne, *Stern,* **Laurence** (1713-1768), an English humorist, born in Clonmel, Ireland. His father, Roger Sterne, was an English officer, and for ten years the family was forced to move with the regiment from place to place. He studied at Halifax and at Cambridge, took orders and obtained a living near York. In 1759 appeared the first two volumes of *Tristram Shandy,* which delighted London

with its sense and nonsense. The ninth and last volume was published in 1767. The following year he wrote *A Sentimental Journey Through France and Italy,* but died before the completion of the plan for making it into a long work. Sentimentality, and indecency at times, are the apparent characteristics of his work; but for the thoughtful there are genuine human qualities, an undercurrent of exquisite literary art and happy unconventionality, which amply justify the wide popularity his writings enjoyed. Other published works are *Letters to His Intimate Friends* and *Letters From Yorick to Eliza.*

Stethoscope, *Steth' o skope,* a device employed by medical men to distinguish the sounds within the cavities of the human body. It is made in various forms, but the one generally used is the binaural pattern, in which two flexible tubes are attached to the point of a hollow gutta-percha cone so as to form earpieces, while the base of the cone is placed over the abdomen or chest of the patient. The art of distinguishing the different murmurs and sounds within the body is called auscultation, and is employed to detect disorders, principally those of the heart and lungs. The stethoscope is a valuable instrument in the hands of an intelligent physician.

Stettin, *Ste teen',* a city of Germany, capital of the Province of Pomerania, Prussia, situated in Prussia on the Oder, 79 m. n.e. of Berlin and a short distance from the Baltic Sea. The site is hilly, and there are extensive suburbs on the west bank of the river and a few on the east bank. The chief objects of interest are the Church of St. Peter and St. Paul; the Cathedral of St. James, erected in the 13th century and restored; the castle of the dukes of Pomerania, now used as a government building; two city gates; the old and the new town halls; and an ornamental fountain. The leading industrial plants include foundries, machine shops, sugar refineries and manufactories of clothing, chemicals, cement and paper. Some of the largest shipbuilding works in the world are located here. Stettin ranks as the third seaport of the German Empire. Population in 1910, 236,145.

Steuben, *Stu' ben,* **Friedrich Wilhelm von,** BARON (1730-1794), a Prussian-American general, born at Magdeburg, Prussia. In 1747 he entered the Prussian military service, rising to the rank of adjutant-general and staff officer, and later was grand marshal to the Prince of Hohenzollern. In 1777 he came to the United States to assist the colonists in their struggle against England, and in 1778 was appointed by Washington inspector-general with the rank of major-general. He accomplished a great work in organizing the army and establishing a much needed system of discipline and economy. He served at Monmouth and Yorktown, and was selected as a member of the court-martial to try Major André in 1780. In this same year he published a manual of army regulations, furnished with diagrams. Grants of land were given him at the close of the war; also, after seven years' delay, a $2400 pension.

Steubenville, *Stu' ben vil,* **Ohio,** a city and county seat of Jefferson Co., 40 m. s.w. of Pittsburgh, Pa., and 23 m. n. of Wheeling, W. Va., on the Ohio River and on the Wheeling & Lake Erie, the Pittsburgh, Cincinnati, Chicago & St. Louis and the Pittsburgh Division of the Pennsylvania. Steubenville is situated on the second terrace of the river in a fertile agricultural region, rich in bituminous coal, natural gas, clay and petroleum. Coal is mined extensively. Large quarries from which excellent building stone is obtained, and brickworks form part of the city's industrial wealth. The chief manufacturing establishments include blast furnaces, paper mills, iron and steel mills, potteries, boiler and tube works, soap works, lamp-chimney and electric-light bulb works, nail factories, tin-plate and clay works and flour mills. Steubenville was one of the first places to use steam for manufacturing purposes. The Steubenville Female Seminary and Gill Hospital are located here. In 1786 a fort was built on the site of what is now

a business part of the city, but no permanent settlement was made until 1797. It was laid out as a town in 1798 and incorporated as a city in 1851. Population in 1910, 22,391. In 1920, 28,508.

Ste'venson, Adlai Ewing (1835-1914), an American lawyer, born in Christian County, Ky., and educated there at Centre College. In 1852 he removed to Illinois, where he was admitted to the bar in 1857, subsequently becoming master in chancery, district attorney, a member of Congress, 1875-1877, 1879-1881, first assistant postmaster-general, 1885-1889, and vice-president of the United States, 1893-1897. At the close of this term he served on the commission to Europe which tried to secure international bimetallism. He was defeated as Democratic nominee for vice-president in 1900 and for governor of Illinois in 1908.

Stevenson, Robert Louis (1850-1894), baptized Robert Lewis Balfour, a Scottish essayist, novelist and poet, born in Edinburgh. He showed an inclination for writing at the age of six; ill health caused his schooling to be very irregular. In an attempt to follow his father's profession of civil engineer he studied at Anstruther and Wick and at Edinburgh University, but he was physically unfit for the heavy duties. The law which he then reluctantly took up at the Edinburgh bar was forgotten as soon as it was learned and he turned his attention entirely to literature. In search for health he traveled on the Continent and visited America, crossing to San Francisco in an emigrant train. He married Mrs. Fanny Osbourne there in 1880. On returning to Scotland he was unable to brave the severe climate and lived in Marseilles, then in London. In 1887 he left Europe never to return. He lived in the United States, among the Adirondacks and in California, cruised among the picturesque South Sea Islands of the Pacific, stopped at Honolulu and Sydney and finally settled at Samoa, where he lived from 1890 until his death, the Samoans lovingly calling him *Tusitala* (teller of tales).

His work falls into three groups, poetry, romances and essays. *A Child's Garden of Verses* contains poems of lingering sweetness and sincerity, yet has not the enduring qualities of his other work. His world of fiction was one of action and events; his are the wild romances of the sea, highly romantic at times, but containing few female characters and having little of the element of romantic love. *Treasure Island,* with its blood-curdling escapades, is a story entirely after the heart of the average fun-loving boy. Other novels include *Prince Otto, Kidnapped, David Balfour, The Merry Men, The Master of Ballantrae* and *Island Nights' Entertainments. The Strange Case of Dr. Jekyll and Mr. Hyde* is a study of dual personality, a wild and searching tale not in the author's characteristic vein. In his essays his telling and vigorous style, the perfection of which was a result of years of patience and toil, appears to best advantage. Here, too, are revealed his singular philosophy of life, an unfailing optimism and a spirit of noble bravery that flashed a smile at the discomforts of chronic illness and at the certainty of an untimely death. The collections are *An Inland Voyage, Travels with a Donkey, Across the Plains, Virginibus Puerisque* and *Familiar Studies of Men and Books.*

Stevens Point, Wis., a city and the county seat of Portage Co., about 20 m. n.e. of Grand Rapids and 100 m. n. of Madison, on the Wisconsin River and on the Wisconsin Central and other railroads. The city is a region rich in pine forests, of which it is the commercial center, and the lumber interests are considerable. Water power is derived from the river and used for manufacturing. Among the industrial establishments are saw and planing mills, machine shops, foundries, paper mills, knitting mills and manufactories of sash and doors, furniture, wall paper, artificial flies for fishing, engines and boxes. Settled in 1836, the city received its present charter in 1897. Population in 1920, 11,370.

Stib'nite, the ore from which most of the antimony of commerce is produced.

It is a compound of antimony and sulphur and occurs in veins in connection with the ores of silver, lead, zinc or iron. See ANTIMONY.

Stick'leback", a family of small, scaleless fish, all members of which are recognized by their platelike covering and sharp spines which lie along the dorsal line. They have small mouths with sharp teeth and make their living by feeding upon the fins of larger fish. They live in fresh or motionless water in temperate zones, being found in Europe, Asia and America. The most interesting fact about the stickleback is its method of nest building. This is done by the male, which secretes a cementing liquid that holds together the sand, sticks and seaweed from which the nest is made. In habit, the stickleback is quick and unyielding; its appetite in insatiable; and in stories of the articles found in its stomach it rivals the fabled sea serpent.

Stick'seed", a branching weed of the Borage Family found in dry ground and by roadsides throughout the United States east of the Rockies and north to Arctic regions. It is a hairy plant, with slender branches bearing a cluster of broad-tipped, gray-green leaves at the base of the stem, and narrower, stemless ones near the top. The flowers are small and blue, white or lavender in color; they grow in branched clusters at the top of the stem and resemble their cousins, the forget-me-nots, only in form of flower and not in beauty. The fruit is a tiny, dry nut armed with two or three rows of sharp, curved bristles which cling most tenaciously to the clothing of the passer-by and to the fur of animals. The Virginia stickseed is found along dry woods in the Southern States and west to Nebraska; its general height is from two to four feet. The European stickseed, more common in the North, is rarely more than one or one and a half feet in height. It is native in Europe and probably made the trip across the Atlantic as a seed clinging to the garments of unwitting travelers.

Beggars' ticks and beggars' lice are often falsely called stickseed, but may be distinguished by the flowers, which are borne in heads surrounded by flat bristles, and by its leaves, which are much-divided. Both of these plants belong to the Composite Family.

Stilicho, *Stil' i ko,* **Flavius** (d. 480), a noted Roman general, son of a Vandal who served as an officer in the Roman army under the Emperor Valens. Stilicho gained renown for his military and diplomatic skill under the Emperor Theodosius, and in 394 he became one of the guardians of Honorius, son of Theodosius. Honorius became Emperor of the West the following year. Stilicho was soon occupied with repelling the invasion of the Goths under Alaric, whom he defeated in 403 at Polentia, near Turin, and at Verona. In 406 Stilicho defeated a large army of Germans and Celts, his last great achievement. Foiled in a plot to place his own son on the throne of Rome, he was assassinated at Ravenna in 408.

Still'wa"ter, Minn., a city and the county seat of Washington Co., about 20 m. n.e. of St. Paul, on the St. Croix River at the head of St. Croix Lake, and on the Chicago, St. Paul, Minneapolis & Omaha, the Chicago, Milwaukee & St. Paul, the Northern Pacific and other railroads. Stillwater is situated in a region of great natural beauty, at the lower end of the "dalles" of the St. Croix, a series of cliffs 30 m. in extent. The town is an important shipping point for cereals and has a large lumber trade. Excellent water power is derived from the river, and there are numerous industrial plants, including lumberyards, machine shops, foundries, grain elevators, a brickyard, flour and feed mills carriage and wagon works, furniture factories and manufactories of farming tools, boots, shoes, boats and boxes. Stillwater is the seat of the Minnesota State Prison, and contains, among other important structures, a fine public library and a handsome city hall, Federal Building, city hospital, county courthouse and an auditorium. It has a business college and two convents. The place was settled in 1843 and incorpo-

rated as a village in 1848; six years later it was chartered as a city. Population in 1920, 7735.

Stilt, Black-Necked, a bird of the Avocet and Stilt Family. It is about 15 inches long. The head, back of the neck, back and wings are black; the forehead has a patch over the eyes; the tail is gray; the throat and under parts are white. During the breeding season the under parts have a slight purple tint. The legs are very long and bright pink; the bill is black, longer than the head, and slender. The nest is made in a slight depression in the ground and the three to four brown-spotted eggs are laid on the bare earth or in a bunch of dry grass.

This graceful and handsome bird is an inhabitant of shallow, marshy ponds and streams, where it feeds on aquatic insects. It ranges from Oregon to northern South America.

Stilts, poles with attached foot rests, or stirrups, by means of which one walks with the steps of a giant, his body being raised, that is, *stilted,* from perhaps one to three or four feet. Among the long-legged birds, known on every continent as *waders,* is the *stilt* whose abnormally long legs raise its body above the flooded grounds over which it feeds. For many centuries, certain peoples of Belgium have been famous stilt-walkers, because the floods of the Meuse and Sambre overspread their fields with such regularity as to encourage wading on stilts. In many other parts of the world they are used partly of necessity, and more generally for pleasure, usually being strapped firmly about the leg below the knee. The stilt-walker commonly carries a long pole with which to balance himself.

Stim'ulant, an agent which artificially increases for a time the functional activity of certain organs of the body or of the whole organism. Stimulants are among the most valuable agents in medicine and have been the means of saving hundreds of lives. Their use, however, is subject to abuse, and many deaths have been caused by employing them improperly. Alcohol in the form of whiskey, brandy and wines is used almost universally for its stimulating effects, but the reaction is injurious. Ammonia also is widely employed as a medicinal stimulant, being taken internally as aromatic spirits of ammonia, or inhaled. The application of heat, friction, poultices and aromatic gums have a harmless, stimulating effect, while such powerful stimulants as opium, ether and strychnine are dangerous, producing injurious after effects and being sometimes fatal. Administered during spasms or other violent attacks, the power of such drugs is greatly reduced and they need to be given in larger doses than under ordinary conditions to produce the desired effect. These drugs should never be used unless vitality is so low as to make their use absolutely indispensable to maintain it, and then under the direction of a physician.

Sting Ray, a large, disagreeable ray-fish of European waters. It has a nearly square, flat body upon the top of which are located the large, ugly eyes. The tail is long and slender and bears upon it one or more fine-toothed spines which are capable of inflicting a severe wound. These fish lie flat upon the sandy ocean bottoms and are often taken up in nets. Specimens have been found upon the coasts of California, Panama, the West Indies and Japan, and they are not uncommon in the rivers of Florida. The largest specimens are 10 or 12 ft. in length.

Stoat, *Stote.* See WEASEL.

Stock, in law, that which represents the capital of a corporation, or the rights and interest which those who contribute to its capital have in its management and in its total assets, including real and personal properties, good will, franchises and profits. Shares of stock may be of any value, as $1, $10, $30, but are commonly $100. Many, but not all, states require stock to be issued at its par value; but its price subsequently fluctuates, being quoted below or above par at any time, in proportion to the total known assets of the corporation and the

confidence of the business world in its future. From the profits of a corporation, preferred stock, if there be any, draws dividends at a fixed rate. Until such a dividend has been paid, no dividend can be declared upon the common stock. If there be cumulative preferred stock, entitled to, for instance, an eight per cent dividend, and the profits permit the payment of only five per cent, then a dividend of three per cent on this stock must be paid before any other dividends can be declared. A record of the stock certificates issued is kept by the company, and dividends go to the recorded owner. The purchaser of stock certificates should therefore have their transfer recorded promptly. See BOND.

Stock Exchange, an institution where stocks are bought and sold. Originally such were public markets; but they are now established and maintained by associations. If the financiers of a community have made large investments in the shares of copper companies, copper stocks will naturally be the basis of many transactions. Thus the Boston Stock Exchange was long practically in control of the copper stocks of the United States; while Philadelphia, through its stock exchange, has been the principal market for the securities of American street-railway companies. Practically every large city maintains a stock exchange; and a seat, that is, membership, usually costs a considerable sum, those in the New York Exchange having sold as high as $84,000. In the exchanges of London, Paris and other European cities American stocks are commonly offered. However, even in the New York Exchange, European securities are not usually found attractive to American investors. While no official record of stock-exchange transactions is kept, unofficial records of the New York Exchange are tabulated with much care.

Stock'holm, the capital of Sweden, situated at the outlet of Lake Mälar into the Baltic Sea. The site is picturesque, for it is built on a number of islands, surrounded by rocky fiords, with a primeval forest skirting and even penetrating into the very heart of the city. It is divided into three parts, Stadholmen, Norrmalm and Södermalm. In Stadholmen, the oldest part of the city, the streets are narrow and winding, and many of the gabled houses have an antique appearance. Norrmalm and Södermalm contain the finest quarters, with modern buildings, spacious gardens and broad streets. Among the public edifices are the royal palace, the House of the Nobility, the Great Church, the Riddarholms Church, the central railway station, the National Museum, the customhouse, the exchange bank, an academy of arts and sciences, the Northern Museum and a new opera house. The principal societies are the Swedish Academy, the Academy of Sciences and the Academy of History, Fine Arts and Archæology.

Several handsome statues include those of the poet Bellman, Charles XII, Axel Oxenstierna, Gustavus Vasa, Birger Jarl, Gustavus Adolphus and Berzelius. The offices for the distribution of the Nobel fund are located near the observatory (See NOBEL PRIZES). The educational institutions embrace a school of forestry, a polytechnic school, the Caroline Medical Institute, a private university and an excellent system of secondary schools. It is the headquarters for several sporting clubs, a regatta by the Royal Swedish Yacht Club being held annually. Skating, tobogganing, tennis, cycling and other athletic sports are emphasized. The iron and steel industries are important, including shipbuilding and engineering. Other manufactures embrace cork, wood, silk, leather, malt liquors and fine porcelain ware. The government mint and printing works are established here. The import trade is the largest in the country, and Stockholm is exceeded in exports only by Göteborg. It was founded by Birger Jarl about 1255, the name Stockholm meaning "the isle of the log." Population 408,702.

Stock Jobbing, commonly the speculative dealing in the shares of large corporations by those who buy or sell on

their own account. Such transactions are usually carried on at a stock exchange. For instance, the $100 shares of a large industrial corporation may actually be offered for sale at $125 each. A then offers to sell B 100 shares at $120 to be delivered on the next day. He owns no such property, but believes that the corporation will not declare its usual dividend and that, before he must make his delivery to B, he can buy 1000 shares at, say, less than $118, and thus make over $2000. Unfortunately for him, the corporation that day declares a large dividend; people think its future bright and begin buying its stock (shares) at $120, $125, $130 or more. Hence A loses a large sum, being forced to pay the market price for the 1000 shares which he delivers to B. B may then actually sell, say, at 132, and make $12 on each share. But he believes the demand for these stocks will go still higher. He therefore holds them. Perhaps the government starts suit to dissolve this corporation, or begins the prosecution of its officers for an alleged violation of the law. The price of B's stocks at once falls to 115; and, before he can find a purchaser, to 112. Fearing that they will decline still further, he sells at this figure. He too has now lost heavily. See CORPORATION; STOCK; STOCK EXCHANGE; BULLS AND BEARS.

Stock'ton, Cal., a city and the county seat of San Joaquin Co., 48 m. s.e. of Sacramento, on the San Joaquin River, at the head of navigation, and on the Southern Pacific, the Atchison, Topeka & Santa Fe, the Western Pacific and other railroads. The climate of the surrounding region is equable; flowers bloom throughout the year; and crops of both temperate and subtropical countries are produced. Grain, vegetables and fruits are raised in large quantities, and Stockton is one of the most important live-stock markets in the West. In addition to the farming activities, which contribute to the wealth of the city, there are extensive manufacturing interests. Lumber, flour, canned goods, agricultural implements, foundry products, window glass, woolen goods, fuel briquettes and leather are the leading manufactures. The city commands the trade of the prosperous San Joaquin Valley.

Stockton is laid out upon a level site, according to a regular plan, and has broad streets and numerous public parks. Its principal institutions are St. Mary's College; St. Joseph's Home for the Aged and St. Joseph's Hospital, both under the auspices of the Sisters of St. Dominic; a state hospital for the insane, a county hospital and the Pacific Hospital; St. Agnes Academy; a children's home; a public library; and the San Joaquin County Law Library. The earliest settlement on the site of Stockton was made previous to 1849 and first called Tuleberg, later New Albany. In that year the present city was platted and named in honor of Com. Robert Field Stockton of the United States navy. It was first chartered in 1850 and in the same year became the county seat. Its present charter provides for the commission form of government. Population in 1920, U. S. census, 40,296.

Stockton, Francis Richard (1834-1902), an American author, born in Philadelphia, Pa. He first wrote for the Philadelphia *Morning Post,* the New York *Hearth and Home* and the *Century Magazine.* From 1873 until about 1880, when he undertook independent authorship, he was assistant editor of *St. Nicholas.* His writings are characterized by a distinctive and individual humor, grotesque and whimsical eccentricity and a pleasing impossibility of absurd though logical conclusions. Of his short stories the famous *The Lady or the Tiger?* has remained a favorite. His juvenile fiction includes *Ting-a-Ling Stories, Roundabout Rambles, Tales Out of School, A Jolly Fellowship* and *The Floating Prince.* Other works are *Rudder Grange, The Late Mrs. Null, The Christmas Wreck, The Hundredth Man, The Bee-Man of Orn, The Casting Away of Mrs. Lecks and Mrs. Aleshine, Pomona's Travels, Afloat and Ashore* and *The Captain's Toll-Gate.*

Stod'dard, Richard Henry (1825-1903), an American poet, critic and journalist, born in Hingham, Mass. He worked in an iron foundry, and through the influence of Nathaniel Hawthorne was appointed collector of customs of the port of New York in 1853. Later he was confidential clerk to George B. McClellan. During this time he wrote poetry, became city librarian of New York, literary reviewer for the New York *World,* and editor of *Vanity Fair,* the *Aldine* and the *Mail and Express.* He published *Adventures in Fairyland, Songs of Summer, The King's Bell, The Story of Little Red Riding Hood, The Children in the Wood, Abraham Lincoln* and *Under the Evening Lamp.* Among the notable anthologies which he edited are *Melodies and Madrigals, Female Poets of America* and *Poets and Poetry of America.*

Stoddard, William Osborn (1835-), an American author and journalist, born at Homer, N. Y. He graduated at the University of Rochester in 1858, edited the Chicago *Daily Ledger* and the *Central Illinois Gazette* and served for three months as volunteer at the beginning of the Civil War. From 1861 to 1864 he was secretary to President Lincoln; later he devoted himself to literary work. He published *The Heart of It, Life of Abraham Lincoln, Lives of the Presidents, The Swordmaker's Inn, With the Black Prince, Lincoln at Work, Jack Morgan, The Boy Lincoln* and *Two Cadets with Washington.*

Stoicism, *Sto' i siz'm,* (from Greek *stoa,* colonnade), the name of a school of ancient philosophy dating from the close of the fourth century B. C. It was named from the corridor or *stoa* of the market place at Athens, where Zeno taught. Related to the system of the Cynics, Stoicism passed back through them to the doctrines of Socrates for its sources. The original founder was Zeno; but much was added by his successors, one of whom, Chrysippus, has been called the second founder. Stoicism was divided into three periods: the old Stoa, the middle, or transition, period, and the later Stoicism of Roman times. It was the most practically influential philosophy of antiquity.

Stoicism was mainly an ethical theory. Nevertheless it had a logic and a physics. Logic dealt with the method of gaining knowledge; physics, with the theory of nature; and ethics deduced from these the consequences relating to practical life. In its theory of knowledge, Stoicism regarded the mind as a blank tablet upon which impressions are made by the external world. In physics, which included psychology and theology, all reality was conceived as corporeal, the active principle of which, fire-spirit, God, is self-conscious. The universe is therefore rational and purposeful. Every individual soul is a part of the universal world-soul, by which it is ultimately absorbed. When one cycle of life is completed another begins.

But Stoicism, as primarily an ethical theory, was chiefly practical in its character. Philosophy was regarded as the practice of wisdom, the exercise of virtue; and for these all science, art and culture exist. The highest law of human action, and the highest good, is to shape our life in harmony with the universal and rational laws of nature. "Follow nature," is the maxim of the Stoics. Be a rational part of a rational universe. The aim of life is not pleasure but virtue, which reason shows to be in harmony with our own true nature. The wise man is free, completely independent of all external circumstances, emancipated from bondage to ambitions and desires. Resignation and strength of will are thus the cardinal Stoic virtues. Stoicism, especially in its later forms, also emphasized rational social relations and the social virtues, such as justice, mercy and friendship.

In modern speech the words *stoic, stoical* and *stoicism* still bear witness to the sterner aspects of this influential school of philosophy. On the whole it was the noblest conception of human life developed in antiquity, apart from Christianity. It numbered among its adherents in Rome such prominent and noted

men as Cicero, Seneca, Epictetus and Marcus Aurelius. See CYNICS; ZENO.

Stomach, *Stum' uk,* one of the organs of digestion, formed by the expansion of the alimentary canal. The human stomach is an elastic bag, shaped something like a curved gourd and having a capacity of about three pints. It lies across the abdominal cavity, just below the diaphragm, with its larger end to the left. It is made up of four layers: a serous, outer coat, composed of smooth, thin, transparent material; a muscular layer, containing a network of muscular fibers; a submucous coat; and a mucous lining, in which terminate some 5,000,000 glands, which secrete the gastric juice necessary for digestion. Food enters the stomach from the esophagus above, through an opening called the cardiac orifice, at its larger end, and leaves it through the pyloric orifice at the opposite end, passing into the small intestine.

Stone Age, an early stage in the development of races when men used tools and weapons of stone. All tribes pass through this period before using metals. In Europe the Stone Age is divided into the Old Stone Age, when tools and weapons were made of roughly shaped pieces of flint, and the New Stone Age, when the stones were shaped into axes, hammers and knives. Various kinds of stone were used, the best specimens being made of highly polished jade.

Stone, Artificial. See CONCRETE.

Stonehenge, *Stone' henj,* a number of large stones standing in Salisbury Plain, Wiltshire, England. These were once arranged so as to form two ovals within two circles with the same center. They are surrounded by a bank of earth 15 ft. high, 1010 ft. in circumference. There are about 140 stones weighing from 10 to 70 tons. Over the plain 300 mounds are scattered, and some which have been opened contain implements of the New Stone Age. The origin and purpose of this collection of huge stones is unknown. Of the many theories the most probable are that it was a sun temple or a burial place for the people in the Bronze Age.

Stone'man, George (1822-1894), an American soldier, born in Chautauqua County, N. Y., and educated at West Point. At the outbreak of the Civil War he became major of the First United States Cavalry, and served in western Virginia and the Peninsula Campaign. Later he was corps commander at Fredericksburg, in the Richmond campaign of 1863 conducted cavalry raids, the following year had a command in the Department of the Ohio and then joined Sherman at Atlanta, subsequently raiding Georgia, North Carolina and Virginia. He was governor of California from 1883 to 1887.

Stonington, *Stone' ing tun,* **Conn.,** a port of entry and summer resort of New London Co., 50 m. s.w. of Providence and 10 m. e. of New London, on the Atlantic Ocean and on the New York, New Haven & Hartford Railroad. A good harbor partly protected by a breakwater adds to the commercial importance. There is regular steamer connection with Boston and New York. The villages of Mystic, Old Mystic and Pawcatuck are contained in the town of Stonington. The chief industrial establishments include printing-press works, silk-thread mills, machine shops, cotton and woolen mills, brass and iron works, spool factories, boiler works, velvet mills and fertilizer works. Shops of the New York, New Haven & Hartford Railroad are located here. For many years Stonington was prominent in the whaling and sealing industry. In 1649 the first permanent settlement was made here and the place called Poquatuck. It was situated within the bounds of Massachusetts until it passed to Connecticut in 1662. The town was named Mystic in 1665 and Stonington a year later. Population in 1920, U. S. Census, 10,236.

Stony Point, a town in Rockland County, N. Y., on the Hudson River at the head of Haverstraw Bay, 42 m. n. of New York City, and on the West Shore and other railroads. The Americans fortified it early in the Revolution, but it was taken from them by Clinton, May 31, 1779, who garrisoned it with 600

British. The addition of two lines of fortification made it almost invincible. Washington desired to recapture this position, in order to prevent an attack upon West Point, and the commission was given to "Mad Anthony" Wayne. Accordingly, at midnight, July 16, 1779, Wayne and 1200 light infantry surprised and carried the fort by a stiff bayonet charge. The Americans did not fire a shot. This was one of the most brilliant assaults on record. Three days after its capture, Washington ordered Stony Point to be evacuated, the fortifications having all been destroyed.

Stor'age Bat'tery, a battery for the storage of electricity. More accurately, the electricity itself is not stored but its energy has been changed into chemical energy, in which form it may be packed away and later brought out to be transformed again into electricity. In the commonest storage battery the electrodes (See ELECTRIC BATTERY) are lead plates immersed in dilute sulphuric acid. When a current has been sent through, or the battery charged, the lead sulphate at the negative plate becomes a spongy mass, while that at the positive plate becomes lead dioxide. The plates could then be removed and preserved for future use. Later, when the battery is being discharged, lead sulphate is again formed at each plate. There are many types of storage batteries, most of which have many plates. In Edison's new storage battery the plates consist of perforated nickel boxes containing nickel oxide and fine iron filings, and are immersed in an alkaline solution. The first successful storage battery was made by Gaston Planté in 1860, and was very similar to that first described. A storage battery is also called a secondary battery and an accumulator.

Stork, a wading bird of the Heron Family. There are several species, but the common white stork of Europe is the best known. When standing, this bird is about four feet high. The plumage is white, with black marks on the wings, and the legs are red. The neck is long and arched and the bill long and straight. During the summer the common stork is found in Netherlands, France, Germany and other European countries. It winters in Africa and southern Asia. The stork is fond of human habitations and frequently builds its nest on the roofs of houses or in boxes,

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which, in some places, are prepared for them. The nest is a large affair, made of sticks, and contains three to five white eggs. In Germany and Netherlands the location of a nest upon the housetop is hailed with delight by the inmates, because they believe that the stork's coming will bring good luck to the family.

Storks feed upon frogs, snakes, insects, small Mammals and offal, and in European cities the birds are often seen mingling with the people upon the streets, where they secure a portion of their food. Because of their value as scavengers they are protected by law.

The affection of the stork for its young has caused it to be considered as the emblem of ideal family life, and children are sometimes led to believe that the coming of a little stranger into the home is due to a night visit from the stork.

Storm, a violent disturbance of the atmosphere occurring in all climates. The term is untechnical and may be extended to include tornadoes, hurricanes and all similar manifestations, though ordinarily it is taken to mean any unusual commotion in the atmosphere, accompanied or not by rain, snow, hail or electrical discharge. Storms may be local, covering a small tract, or they may be general, extending over a vast area. A single storm may spread over the entire Continent of Europe, affecting, as is usual, a circular area; while a tornado, though moving in a narrow track, may, and has been known to, travel halfway round the globe. General storms are sometimes seasonal and sometimes due to local causes.

All storms may be classified as cyclonic, which originate in areas of low pressure; the anticyclonic are those arising in cool high-pressure areas. Both classes are due to disturbances in the atmosphere brought about by difference in density in different layers of atmosphere or the atmosphere of adjacent regions. Cyclonic storms of this sort extend over large areas and move with different rates of velocity in different regions, their progress being comparatively slow, while in the tropics it is more rapid and often attains the velocity of a hurricane. Storms of this type are most easily understood by studying them with the aid of a weather map of the United States. These maps always show one or more areas of low barometric pressure and one or more areas of high pressure. The wind blows from all points towards the area of low pressure. The meeting of these winds usually causes condensation of water vapor followed by rain or snow (See RAIN). The great region of these storms in North America includes the portion of the continent between the Rocky and the Appalachian mountains. One studying the weather in this region soon learns that during the spring and summer months the weather usually undergoes a change every eight or ten days. At first a wind blows from the northwest, giving a cool atmosphere and clear skies. Then it veers to the west, southwest, south, east and northeast. Winds from the southwest and south usually cause precipitation. The center of low pressure moves across the country approximately from west to east, and periods of cloudiness and rainfall alternate with about equal periods of fair weather.

At the center of low pressure the air ascends in a spiral movement, spreading out horizontally on reaching the dew point, where its moisture is condensed to form clouds (See DEW; CLOUD). This spiral motion is in the Northern Hemisphere contrary to the direction of the clock hands; in the Southern Hemisphere it is reversed. When anticyclonic disturbances occur, there is a downward rush of cold air at the storm center in a whirl which moves in a contrary direction. The direction of this rotary motion is determined by the the earth's rotation. In the general circulation of the atmosphere, the deflection of surface winds causes them to blow to the west as they approach the equator. When the air currents of a gathering storm and those of the general circulation flow side by side, the storm occurs as an eddy along the line of junction, and the storm currents, being the stronger, determine the direction of the whirl. The eddy develops into a whirl of enormous areas, if it originates in an area where there is great difference in barometric pressure; that is, where there are very marked local differences in temperature.

The region of greatest frequency for storms in the Northern Hemisphere lies within a tract beginning to the north of Australia and extending through Japan, Korea, across the Pacific, embracing Alaska, Canada and the central and eastern parts of the United States, crossing the North Atlantic and including nearly

all of Europe and parts of western Asia. The larger part of Asia is, however, storm-free; also northern Africa (except for the sandstorms of the Sahara) and the Arctic regions. In the middle latitudes the storms move without exceptions in an easterly or northeasterly direction.

Until comparatively recent times little was known of the law of storms. In the middle of the 19th century simultaneous observations by trained observers working under the direction of a central bureau began to be made. From the data so collected valuable synoptic records could be made. Nearly all the governments of the world now have departments which conduct systematic observations of the weather. At a central office telegraphic reports of conditions are received regularly from weather men stationed in all parts of the country, on the basis of which is constructed a chart or weather map for the whole country and the weather forecast made. By this means the movements of many storms, particularly those of a general character, can be foretold. Warnings sent out by the United States Weather Bureau have resulted in the annual saving of millions of dollars in property and hundreds of lives. See Weather Bureau; Cyclone; Hurricane; Tornado; Wind.

Stormy Pet'rel. See Petrel, subhead *Stormy Petrel.*

Sto'ry, Joseph (1779-1845), an American lawyer and jurist, born in Marblehead, Mass., and educated at Harvard. In 1801 he was admitted to the bar and, having for a time devoted himself to literary pursuits, with scant success, he then turned his attention to law and politics, serving in the State Legislature and then in Congress, where he remained from 1808 to 1811. From November of that year until his death he was associate judge of the United States Supreme Court, but, meanwhile, in 1829, he became Dane professor of law in Harvard, which position he also filled till his death. His judicial works, some 60 volumes in number, evince great learning, clear exposition and profound legal views, and have done much to shape American legal and legislative practice. They include special treatises, commentaries and judgments.

Story, William Wetmore (1819-1895), an American sculptor, son of the eminent jurist Joseph Story, born at Salem, Mass., and educated at Harvard University. He prepared to practice law and was admitted to the bar, but his fondness for art took him to Italy in 1848, where he took up his abode, giving his attention almost entirely to sculpture. He is widely known for his statues of eminent Americans, including those of his father, Edward Everett and George Peabody. He also executed busts of James Russell Lowell, Theodore Parker, Josiah Quincy and William Cullen Bryant. He was a United States commissioner on fine arts at the World's Fair in Paris in 1879 and received numerous decorations from France and Italy. Some of his best-known ideal works are *Sappho, Saul, Thetis and Achilles, Cleopatra* and *Semiramis.*

Story was an accomplished writer and musician. He published an edition of his father's writings, and, before going to Italy, a volume of poems. He was the poet of his class at Harvard, and in 1856 delivered a poem at the dedication of the Statue of Beethoven at Boston.

Stove, a well-known article used in households for heating and cooking. It is claimed that cast-iron stoves were made as early as 1490 in Alsace, Germany, but those composed chiefly of tile or earthenware blocks were used previous to the 18th century and are still being used in the country among the peasants of Russia and Germany. The American colonists built brick ovens and open fireplaces, with swinging cranes for hanging pots and kettles over the fire. Bread was baked either in a brick oven, previously heated with a fire inside and then withdrawn, or in a covered pot placed in the coals and hot ashes.

Benjamin Franklin, in 1744, invented a heating stove made of cast-iron plates set in the fireplace, with a down draft, using coal, and box stoves sprang from

this idea and came soon into use, with oven arrangements for baking and holes for pots. From the cast-iron heating pot developed the modern cylindrical wood stove, and from the base-burning coal stove, patented by Jordan L. Mott, Sr. of New York, in 1833, the modern magazine self-feeding stove has been produced. The best and most durable stoves and ranges for cooking purposes are now constructed of steel plates, and have many conveniences for the housewife. Stoves of many patterns are in use for various kinds of fuel, wood, coal and gas, and those provided with generators for gasoline and kerosene are convenient and well adapted to cooking during the warm weather. The stoves made in the United States each year are valued at about $35,500,000. See FURNACE.

Stowe, *Sto,* **Harriet Beecher** (1811-1896), a famous American novelist, born in Litchfield, Conn. Her father, Lyman Beecher, and brother, Henry Ward Beecher, were eminent clergymen. During the residence of the Beecher family in Cincinnati, Ohio, where in 1832 her father was called to the presidency of the Lane Theological Seminary, Harriet gained personal knowledge of the way fugitive slaves were handled. Her marriage in 1836 to the Rev. Calvin E. Stowe, a strong anti-slavery man, and several journeys with him into the slave states, strengthened her feeling against slavery, which culminated in her writing the book by which she is best known, *Uncle Tom's Cabin.* The novel was published in serial form in the *Washington National Era,* between June, 1851, and April, 1852, being issued in book form in 1852. Other books followed in rapid succession, and in 1868 Mrs. Stowe became associated in Hartford with D. G. Mitchell in the editorship of *Hearth and Home.*

Uncle Tom's Cabin is probably the most widely read novel of modern times. Being the outcome of a bitter national struggle, it has aroused intense admiration and disapproval, but, unlike many books produced by special occasions, it has not sunk to oblivion, because of its vitality, pathos, dramatic power and human appeal. Mrs. Stowe's other novels, though loose in structure, are still the work of a genuine story-teller. They include *The Minister's Wooing, The Pearl of Orr's Island, Oldtown Folks, Pink and White Tyranny* and *We and Our Neighbors.*

Strabismus, *Stra biz' mus.* See SQUINTING.

Stradivari, *Strah" de vah' ree,* **Antonio** (1644-1737), an Italian violin maker, born at Cremona. He was a pupil of Nicolas Amati, in whose shop he worked for many years. During his long life he made several hundred instruments, including violins, violoncellos, viols, mandolins and guitars. He exercised the greatest care in the selection and preparation of his material and in construction; and his violins have never been equaled. He fixed a standard which was followed by all his successors. Some 25 of his best violins have been preserved and are more highly prized than those of any other maker.

Straits Settlements, the collective name given to the crown colony formed by the British possessions on or adjoining the mainland of the Malay Peninsula, including Singapore with Labuan; Penang with Province Wellesley and the Dindings; Malacca, the Keeling Islands and Christmas Island. The city of Singapore on the Island of Singapore is the capital city. The government is in the hands of a governor, an executive council, a legislative council and a colonial secretary. The principal products are pepper, tapioca, rice and sugar. The area of the combined settlements is about 1550 sq. m., and the population, which varies continually, is about 573,000. See SINGAPORE.

Stramo'nium, an ill-smelling, little-used narcotic obtained from the seeds of a weed variously known as jimson weed, stinkweed and Jamestown weed, of the Nightshade Family. The plant is coarse, with angular, branching stems and large, pointed leaves. It is a native of Asia and was brought to the United

States for the sake of its drug-producing pods of seeds, but never became very important. In small doses stramonium is a mild sedative, but, taken in large quantities, produces delirium and death. See JIMSON WEED.

Strassburg, *Shtrahs' boork,* a city of France, capital of Alsace-Lorraine, situated on the River Ill, 2 m. w. of the Rhine, 370 m. s.w. of Berlin and 250 m. e. by s. of Paris. Strassburg is one of the most strongly fortified cities of Europe and is surrounded by forts and ramparts. The old part of the city has narrow streets bordered with houses of medieval structure. The most imposing building is the Strassburg Cathedral, begun early in the 11th century. It is one of the most noted cathedrals of Europe and is noted for its fine sculptures, its rose window 45 ft. in diameter, its tower 465 ft. high and its astronomical clock. Other buildings of interest are the Church of St. Thomas, the municipal museum, the new imperial palace and the buildings of the university. The city has many statues, among them one of Gutenberg. The university has a library of 800,000 volumes and over 1400 students. There is a public library of over 115,000 volumes.

The chief industries include the manufacture of cigars, organs, clothing, machinery, spirituous and malt liquors, leather and books. The city is connected with the Rhine by canals and is an important commercial center. Population in 1910, 178,913.

Strassburg Clock, the clock in the tower of the Strassburg Cathedral, famous for its size and automatic figures. The first one was made in 1352, the second in 1570, and the present one, which stands 30 ft. high on a base 15 ft. wide, was built in the early part of the 19th century. On the first story of the clock stands a large globe of the heavens, showing the course of the stars, and behind it is a calendar indicating the day of the month and the date of all religious festivals, etc. Automatic figures in chariots are drawn across a platform to indicate each day; thus Apollo is shown on Sunday, Diana on Monday, and so on. Above this platform is a large clock dial, with a planetarium above it; still farther up is a globe showing the moon's phases. On the next platform are four figures representing the periods of life —infancy, youth, old age, death—and these strike the quarters of an hour alternately in the order named. Surmounting the whole is a figure of Christ. On each day at the hour of noon, a procession of the Twelve Apostles is shown, together with a cock that crows three times.

Strat'ford, a city of Canada in the Province of Ontario, capital of Perth Co., situated on the Avon River and on the Grand Trunk Railway, 83 m. s.w. of Toronto. It derives its name from Stratford-on-Avon, England, and five of its wards have been named for characters of Shakespeare. The streets are well paved, and among the fine public buildings are the collegiate institute and the provincial normal school. The chief industrial establishments are the repair shops of the Grand Trunk Railway, agricultural-implement works, flour and woolen mills and sawmills. Cheese and other dairy and farm products are exported in large quantities. Population in 1911, 12,946.

Stratford-on-A'von, a municipal borough and township in Warwickshire, England, situated on the River Avon, 8 m. s.w. of Warwick. It is famous as the birthplace of Shakespeare, and the house in which he was born still remains. A Shakespeare memorial building contains a gallery of Shakespearean paintings, a library of rare works on Shakespeare and a theater. In the neighborhood, at Shottery, is the Anne Hathaway cottage, and at Wilmcote, the cottage of Shakespeare's mother. About 30,000 tourists, of which one-fourth are Americans, visit this historic spot annually. Population, about 10,000.

Strathcona, *Strath ko' na,* a city of Canada in the Province of Alberta, on the Edmonton Branch of the Canadian Pacific and on the Canadian Northern and Grand Trunk Pacific railways, 191

m. n. of Calgary. The city is a division point for the Canadian Pacific and the Canadian Northern railways. Among the important buildings are hotels, schools and churches. It is the seat of the provincial university. The leading industrial establishments include grain elevators, flour, oatmeal and lumber mills, tanneries, a brewery, a meat-packing plant, a brickyard, a sash and door factory and a hosiery factory. Coal is exported. Population in 1911, 5579.

Strathcona and Mount Royal, Donald Alexander Smith, LORD (1820-1914), a Canadian statesman, born in Scotland. In 1838 he came to Canada, where he made connections with the Hudson's Bay Company, working for 13 years on the Labrador coast and later in the Northwest, and being gradually promoted until he was resident governor and chief commissioner of the company in Canada. He entered the Legislature of Manitoba, 1870, was called to the Northwest Territorial Council and was returned to the House of Commons, where, barring from 1880 to 1887, he remained until his retirement in 1896. That year he was appointed high commissioner to London. His name is closely linked with the railway development of Canada, and it is probable that if it were not for the financial and moral support of Lord Strathcona, the Canadian Pacific would not be existing today. In recognition of his services, he was raised to the peerage by Queen Victoria in 1897.

Straus, *Strous,* **Oscar Solomon** (1850-), an American diplomat, reformer and merchant, born at Otterberg, Bavaria, of Jewish parentage. He came to America in 1854, and was educated at Columbia University. When 15 he removed from Columbus, Ga., to New York, where he practiced law from 1873 to 1881, and from then until 1906 belonged to the firm of L. Straus & Sons, importers of pottery and glassware, in which connection he amassed a large fortune. As a Democrat he was meanwhile appointed minister to Turkey in 1887, and upon associating himself with the Republicans in 1896 was reappointed to that post by President McKinley. In 1902 he was appointed a member of the Permanent Court of Arbitration at The Hague to fill the vacancy of Ex-President Harrison; from December, 1906, to March, 1909, he was secretary of the department of commerce and labor, succeeding Victor H. Metcalf in the cabinet of President Roosevelt; and from May of that year until December, 1910, he was ambassador-extraordinary and plenipotentiary to Turkey. Mr. Straus has written extensively on reform and political subjects. In 1912 he was nominated for governor of New York on the Progressive ticket, but was defeated.

Strauss, *Shtrous,* **David Friedrich** (1808-1874), a distinguished German philosopher and theological writer, born in Ludwigsburg. He studied in Tübingen and began his work as a country pastor. In 1830 he was appointed professor in a seminary in Maulbronn. He resigned this position and went to Berlin to study under Schleiermacher and Hegel. Returning to Tübingen as a lecturer in 1832, he published in 1835 his famous *Life of Jesus* (*Das Leben Jesu*), built up on the Hegelian principles. It sought to explain the origins of Christianity on the mythical theory, and caused a sensation throughout Germany and great opposition. For 20 years he then turned aside from theology and wrote biographies that have given him a permanent place in German literature; but he returned again to theological writing before his death. The inadequacy of his Biblical theories was at once apparent, but his *Life of Jesus* inaugurated a new era in New Testament criticism.

Strauss, Johann (1804-1849), an Austrian orchestral conductor and composer of dance music, born at Vienna. He was recognized as the greatest composer of dance music of his time, and became famous for the performances of his band, with which he made many tours of Europe and England. He was survived by three sons, Johann, Joseph and Eduard, all of whom attained fame as composers.

Strauss, Richard (1864-), a German composer, born at Munich, the son of an eminent physician, Franz Strauss. Having mastered the technics of violin and piano, he began composing at an early age. He has held numerous important positions as director, chapelmaster and conductor of music, and has written several music dramas, of which the best known is *Salome,* and a large number of songs and orchestral works. Strauss is one of the most ingenious exponents of the school of Liszt and Wagner, and has been conspicuous as a leader in the modern music movement initiated by the latter. Among the best known of his compositions are the "tone poems" *Macbeth, Don Juan, Till Eulenspiegel, Don Quixote* and *Thus Spake Zarathustra.*

Straw, the dry or ripened stalks of certain plants, chiefly wheat, rye, barley and oats. It is employed in the manufacture of rugs, matting, coarse cloth, hats, bonnets and paper; for the latter, rye straw is most commonly used. Bedfordshire, England, has long been the center of the straw-working industries owing to the favorable conditions of the climate for producing a fine quality of straw. In the United States large factories are located in Massachusetts; Tuscany, Italy, where the well-known leghorn hats are made, France, Germany and China are all engaged in this industry. For the ordinary uses of straw for fodder, bedding and packing, it is prepared on the farms where the grains are raised.

Straw'berry, a trailing vine of the Rose Family, whose luscious red berries are exceedingly popular in the spring. The vine is grown everywhere in the United States, where it thrives on all sorts of soils and is rarely affected by disease or infested by insects.

To start a bed of strawberries, only young plants should be used. In the North they are best planted in the spring, but in the South fall planting is advisable. To allow the plants to spread they should be set in rows that are three or four feet apart, and the individual plant should be at least one and one-half feet apart. This also insures room for cultivation, which should be done frequently during the growing season. In the North the plants should be covered with straw to prevent their freezing. Strawberry flowers are of two kinds, the perfect and the imperfect. The imperfect have no stamens and will not bear fruit unless planted among perfect vines. The cultivated varieties of strawberries produce large, juicy fruit, which it would be only an aggravation to describe. The favorite kinds are the Glen Mary, Dunlap, Sample, Michel, Bubach, Brandywine and Gandy. Although strawberries are raised throughout the United States, the Gulf States are chiefly concerned in their production for the market. Wild strawberries, though sweet and of delicious flavor, are very small. They grow by the roadsides and in meadows throughout the United States, where they are eagerly sought by children.

Streator, *Stre' tor,* **Ill.,** a city of La Salle Co., 94 m. s.w. of Chicago, on the Vermilion River and on the Chicago & Alton, the Chicago, Burlington & Quincy, the Wabash, the Chicago, Indiana & Southern, the Atchison, Topeka & Santa Fe and other railroads. The town occupies the center of an agricultural section and has rich deposits of coal and clay in the vicinity. It has manufactories of carriages and wagons, railway cars, brick, sewer pipe, tile and several kinds of glass, and operates machine shops, planing and flour mills and foundries. An extensive trade is carried on in coal, live stock, grain and in dairy and manufactured products. Streator has good educational facilities and numerous churches. Its important buildings are an opera house, a government building, municipal buildings, St. Mary's Hospital and a Carnegie library. The city was settled in 1868 and incorporated in 1882. Population in 1920, U. S. census, 14,779.

Street Railway, a railway laid in the streets and designed especially for carrying passengers. It is a development

of the tramway, which was originally used in England for hauling coal from the mines. The first street railway in the world was laid in New York City in 1831 and 1832. Horses were used for the motive power, stagecoaches, mounted on wheels made to keep the rails, for cars. The first line extended from the Bowery to Harlem. The enterprise was a success from the start, and other lines soon followed. Within 30 years every large city in America and Europe had street railways. For a long time horses furnished the only practical means of hauling the cars, though numerous attempts were made to employ steam or electricity. In 1873 a line was constructed to operate by cable. This was successful and cable-car systems were introduced into Chicago and some other cities. Most of these systems, however, have been replaced by electric railways. See ELECTRIC RAILWAY.

Strength of Material, the resistance which materials offer to alterations or changes in form, such as elongations, bending, twisting and compression. These changes are called strains, and the force with which the material resists a strain is termed a stress. Materials may be exposed to five different strains: a tensile, or stretching, strain in the reduction of its fibers, as in the case of rods and ropes; a transverse strain, acting vertically or obliquely to its length, as in joists and levers; a crushing strain by pressure of weight, as in posts and pillars; a tortional, or twisting, strain, as in shafts and axles; and a shearing strain, like that borne by plates when cut by a shearing machine. A strain beyond the elastic limit produces a fracture.

Various machines have been developed for testing the strength of materials, and many formulas have been worked out to express these quantities, so that engineers may know how to calculate the size of different parts of a bridge or machine and distribute the metal properly, and so that architects may be able to determine the size of posts, girders, etc., in buildings.

Strict Constructionists. See POLITICAL PARTIES IN THE UNITED STATES.

Strikes and Lockouts. A strike is a cessation of work by common agreement on the part of laborers for the purpose of bettering their conditions of employment. A lockout is a stoppage of work resulting from notice given by the employers. A hard and fast line cannot be drawn between the two, however, for, in cases of dispute, it is often difficult to determine on which side the demand was originally made, and the distinction is not important. Strikes are among the means labor has of bringing to the notice of employers and the public its grievances and its demands for the betterment of conditions, and as such they are defended by labor organizations.

CAUSES. The chief causes of dispute relate to the question of wages. Other important causes are, for reduction of hours of labor, defending a right to belong to and act through a trade union, enforcement of union rules and sympathy. The report of the industrial commission gives the following statistics in regard to causes, covering the period from 1881 to 1900. Of the whole number of strikes, 28.7 per cent were caused by demand for increase of wages; 11.23 per cent, reduction of hours and increase of wages; 11.16, reduction of hours; 7.17, opposition to reduction of wages; 3.47, sympathetic; 3.26, recognition of union, with enforcement of union rules. These percentages are practically the same for the period from 1900 to 1910.

HISTORY. Strikes and lockouts are the outgrowth of the present industrial system. When industries were under the ownership and management of individual proprietors and the proprietor and his journeymen and apprentices worked side by side, whatever differences arose between employer and employee were easily and quickly adjusted. With the growth of the factory system, however, and especially with the development of the large corporation, the personal touch between employer and employee was lost, and the employee came under the

direction of foreman or superintendent, whose chief aim was to turn out the largest product at the least expense; and in order to accomplish this, labor conditions were made exacting and sometimes well nigh intolerable. The organization of capital naturally led to the organization of labor, and when labor organizations were unable to better their conditions by their demands, they naturally endeavored to force their employers to grant these demands by stopping work. In this way the strike arose.

The first strike in the United States was the bakers' strike in New York in 1741. The first strike of importance was that of the sailors in New York in 1802. No strike of large proportions occurred in this country until after 1870. In 1877 occurred the great strikes on the Baltimore & Ohio and the Pennsylvania railroads. In 1883 the telegraphers throughout the country struck to secure increase of wages and shorter hours. In 1885 there was a general strike on the South Western, or Gould, System of railways. In 1892 was the great strike at Homestead, Pa., and in 1894, the railway strike, which began in Chicago and for several weeks nearly paralyzed transportation in the Middle West. The strike most seriously affecting industries was that of the anthracite coal mines in Pennsylvania in 1902. This strike was finally settled through the intervention of President Roosevelt, who appointed a commission which arbitrated the difficulties. Notable strikes occurring since then are the strikes of the shirtwaist makers in New York in 1909, the Chicago garment workers' strike, 1910, and the strike of the mill operators in Lawrence, Mass., in 1912. In 1911 occurred the great railway strike in England, which completely tied up traffic throughout the United Kingdom until the demands of the strikers were considered. Following this was the still more general coal miners' strike of 1912.

Methods of Settlement. More or less violence accompanies nearly all strikes, though this is often due to irresponsible parties who seize the opportunity for plunder than to the strikers themselves. Formerly strikes were settled largely by force, not necessarily force of arms, but a contest which lasted until one party surrendered. Within recent years most strikes have been settled by arbitration, and the United States Government, as well as many state governments, have enacted laws, enforcing in a measure the results of such arbitration. Since the organization of the department of commerce and labor, the commissioner of labor is the official arbiter of the government in all cases affecting railway employees, and through his intervention several important strikes have been prevented. In 1907 Canada passed the Industrial Disputes Investigation Act, which makes strikes and lockouts unlawful in industries termed public utilities, prior to or during the reference of such a dispute to a board of conciliation. This act also compels public utility corporations to give 30 days' notice prior to change in wages or hours of work. See Arbitration, Industrial; Cooperation; Labor Organizations. Consult U. S. Commissioner of Labor, *Twenty-first Annual Report* (1906); Commons, *Trade Unionism and Labor Problems;* Adams and Sumner, *Labor Problems; United States Industrial Commission Report,* Vols. XVII and XIX.

Strindberg, *Strind' ber y',* **August** (1849-1912), a Swedish poet and dramatist. Few authors have had as stormy a career as he; he struggled constantly in his youth with bitter poverty, entered upon and gave up various professions, was three times married and as many times divorced, was at one time so violently insane that he was forced to be restrained, and was a prolific writer of drama, history, novels, poetry and travels. The characteristics of his work are an unbending, even brutal, realism, and a gloomy pessimism. His writings include *The Red Room, Marriages, The Swedish People in Every Walk of Life, The Father, The Dream Play, The Dance of Death* and *There are Crimes and Crimes.*

Stroboscope, *Strob' o skope,* an instrument which permits viewing a moving object by intermittent sight. Its simplest form consists of a vertical cardboard cylinder having upright slits made in its walls near the top, with a tape or strip of paper with pictures of moving objects in different states of motion placed on the inside. When the cylinder is revolved on its axis, the pictures are viewed from the opposite side through the slits, with the same effect as that produced by moving pictures. See MOVING PICTURES.

Stromboli, *Strom' bo lee.* See LIPARI ISLANDS.

Strontium, *Stron' shi um,* a rare element found in nature chiefly as strontianite and celestite. It was first obtained by Davy in 1808. Strontium is a bright yellow metal which oxidizes readily in air and burns with a bright red flame; for this reason many of its compounds are used in the manufacture of fireworks. Its carbonate is used in the refining of sugar.

Strychnine, *Strik' nin,* or **Strychnia,** *Strik' ni a,* a complex chemical compound obtained from the bark and wood of the Gentian Family, notably the bean of St. Ignatius and the nux vomica. It is a white, crystalline solid whose presence is detected by chemists by its changing color when treated with certain acids. Strychnine is an active poison but is used medicinally in cases of paralysis and where a heart stimulant is required. A reliable antidote in cases of strychnine poisoning is 30 grains of powdered ipecac taken in warm water to act as an emetic. Another recommended antidote is 20 grains of sodium bromide given every hour.

Stu'art, Charles Edward. See CHARLES EDWARD.

Stuart, Gilbert (1755-1828), an American portrait painter, born in Narragansett, R. I. He began to paint portraits when a mere boy, and though his work was crude his likenesses were good. At the age of 15 he became the pupil of Cosmo Alexander, a Scotch artist, who took him to Scotland. The death of Alexander soon after reaching home threw Stuart upon his own resources and he returned to America. He again went to England just before the beginning of the Revolutionary War and for several years studied with Benjamin West, when he opened a studio in London. From the beginning his work was successful and he became the fashionable artist of London. In 1792 he returned to the United States and painted the portraits of a number of public men, among them John Jay and Washington, of whom he made three portraits. He is best known by his third portrait of Washington, of which only the head was finished. It is considered the best likeness of the Father of his Country.

Stuart, James Ewell Brown (1833-1864), an American soldier, born in Patrick County, Va., and educated at West Point. Having entered the cavalry, he served against the Cheyenne Indians. In 1861 he resigned his rank of captain in the United States army, and when Virginia seceded he was made a lieutenant-colonel of Virginia troops. One of the most daring of Confederate cavalry officers, he was chief in cavalry command at the first Battle of Bull Run, shortly being promoted brigadier-general. In June, 1862, he was especially active on the flanks of McClellan's army, and on the Chickahominy, later fought in the second Battle of Bull Run, led Jackson's advance into Maryland, saw service at South Mountain, Antietam and Fredericksburg, and succeeded to temporary command on the death of Stonewall Jackson at Chancellorsville. In Grant's campaign against Richmond, in 1864, he was mortally wounded while encountering Sheridan's cavalry at Yellow Tavern, and died in Richmond. General Stuart was popularly known as "Jeb" Stuart.

Stuart, Ruth McEnery (1856-), an American author, born in Avoyelles Parish, La. She studied at New Orleans, and in 1879 married Alfred O. Stuart, a cotton planter of Arkansas. In 1888 she began to contribute to some of the leading magazines, writing stories revealing a wide range of interest.

Among her works are *The Story of Babette, Sonny, Holly and Pizen, George Washington Jones, The Woman's Exchange, The Second Wooing of Salina Sue* and *Aunt Amity's Silver Wedding.*

Stuart, House of (also written Stewart and Steuart), a Scottish family descended from a Norman lord whose grandson Walter became steward of David I; the name of the office was adopted as a family name. The first Stuart of the royal line was Robert, who was grandson of Robert Bruce on his mother's side, and who ascended the Scottish throne as Robert II.

The direct legitimate male line ended with James V, who was succeeded by his daughter Mary. She was succeeded by her son, James VI of Scotland, who became James I of England. James was followed by his son, Charles I, and his two grandsons, Charles II and James II, the sons of Charles I. When James II fled from England in 1688, Parliament debarred the elder male line descended from James I and invited William of Orange (descended from the eldest daughter of Charles I) and his wife Mary, the eldest daughter of James II, to rule in England. William died in 1702 and was succeeded by Anne, the youngest daughter of James II. When she died, George, of the House of Hanover (whose grandmother had been Elizabeth, the daughter of James I), became King of England as George I; the House of Stuart was thus succeeded by the House of Hanover.

Stucco, *Stuk' o,* a kind of plaster in which sand is replaced by pulverized marble. It is a beautiful, white material suitable for finishing interiors, as it takes a smooth, satin polish like marble. Moldings of stucco, when skillfully made, bear a close resemblance to marble fashioned into similar form. Stucco was extensively employed by the Moorish (Arab) architects for the interior of the Alhambra. The Greeks and Romans used it freely, and some fine examples of stucco work much resembling marble are to be found in Florence and Rome. Henry VIII's chapel in Westminster contains a ceiling of stucco. See ALHAMBRA, THE; CEMENTS.

Sturgeon, *Stur' jun,* a family of marine and fresh-water fish of the United States. Their chief distinguishing characteristics are the fine rows of horny plates with their extended hooks, the four sensitive feelers below the long, protruding snout, the unsymmetrical caudal fin and the suckerlike mouth which is upon the underside of the head. There are three genera, two of which are found in cool, clear rivers all over the United States, and the third, known only in marine species, that frequents the coastal rivers only in spawning season. Sturgeon are clumsy fish and are not particularly desirable as food, though many are taken from the Great Lakes. The eggs are used in preparing caviar (See CAVIAR). A Pacific sturgeon is the largest American sturgeon, often weighing over 500 lb. A still larger one, said to attain a length of 25 ft. and to weigh 3000 lb., is known in Russia.

Sturm, *Shtoorm,* **Johann** (1507-1589), an eminent German educator, the originator of our modern graded-school system. He was born at Schleiden, Prussia, and educated at Leyden and Louvain. He founded the school known as the Gymnasium of Strassburg, which, under his able administration of more than 40 years, attracted world-wide attention, and subsequently became a university. His methods of organization were influential in Germany, were adopted in England at such famous schools as Eton and Rugby, and were gradually developed into the graded system that we know. He organized his school into 12 classes, or grades, each preparing its pupils for the next higher, and the last fitting its members for college; so that it is only in details that there has been general modification of the plan since his time. His practical, clear and forceful instruction, with his judicious methods of organization, made him the foremost educator in the Reformed Church of his day, and insure him a permanent place in the educational history of the world.

Stutt'gart, a city of Germany, the capital of the State of Württemberg, situated south of the River Neckar, 90 m. n.w. of Munich. The stately and imposing city is surrounded by attractive suburbs nestling between vine-clad hillsides, and contains many fine buildings of Renaissance architecture. They include the palace of the crown prince, the Royal Theater, the palace, the Gothic Stiftskirche, the royal public library, the famous academy known as Karlsschule, the Polytechnic Institute, the Stuttgart Museum of Art, the Queen Olga buildings and the Peace Church. Stuttgart leads southern Germany in the printing and book-publishing business and its manufactures include carriages, pianos, furniture, cigars, jewelry, leather, paper, chemicals, chocolate, cottons and bells. The city was first known to history in 1229; it was made the capital of Württemberg in 1482 and since 1800 has had an unusual development and progress. Population in 1910, 285,589.

Stuyvesant, *Sti' ve sant,* **Peter** (1592-1672), a Dutch governor of New Amsterdam, born in Holland. In 1647 he became ruler of New Netherland, in which capacity, while able, honest and energetic, he was testy and imperious. Despite his efforts, the colony was lost to England in 1664. In 1665 Stuyvesant went to Holland. On his return he settled, for the remainder of his life, on his farm, the Bouwerij; hence the name of the present Bowery of New York City.

Styx, *Stiks,* in Greek and Roman myths, the encircling river of Hades, across which Charon ferried the dead. The name was also given to a torrent in Arcadia, the surroundings of which suggested to the Greeks the gloomy entrance to the under world.

Submarine, *Sub" ma reen',* a war vessel fitted to operate beneath the surface. The submarine is built so strongly that it can resist the pressure of the water at 200 ft. depth. The boat is completely decked over, and above the deck rises the conning tower surmounted by the bridge and the two periscopes, or observation tubes, each six inches in diameter and rising to a height of 20 ft. or more above the deck. The hull of the boat is provided with water tanks into which water is admitted in "diving" or submergence, and from which it can be expelled by means of compressed air and pumps, upon rising to the surface. The boat is provided with the most powerful machinery, run by fuel oil when cruising at the surface and by storage batteries when cruising submerged. The boat can be made ready to "dive," decks cleaned, etc., in a few minutes; after which the hull can be sealed, watertight, water admitted to the tanks, and complete submergence take place in three minutes. The boat can remain submerged, when running at the rate of 10½ knots an hour, for about 12 hours or more. These boats can maintain themselves separated from their tenders for four or five days. By means of this submergence they are enabled to find their way to the very spot where the battleship lies and to launch their torpedoes with most deadly effect. See NAVY; WARSHIP, subhead *Torpedo Boat;* TORPEDO BOAT DESTROYER.

Subpœna, *Sub pe' na,* a writ commanding the person named therein to appear in court and testify in the case named in the writ. The subpœna may also command the witness to produce any books and papers the court may wish to examine. If a party disobeys a writ of subpœna, he is liable for damages unless he has a good legal excuse.

Subtreas'ury. See TREASURY DEPARTMENT.

Suck'er, a large family of freshwater fish, found abundantly in the streams of the Mississippi Valley and westward. It is closely allied to the Herring Family but differs from it chiefly in structure of skeleton. Externally, its greatest difference is the small mouth, with thick, roughened lips and numerous teeth. The commonest species of sucker grows to a length of from 10 to 14 inches and has a long dorsal fin and rounding body. Suckers feed upon insects and small aquatic animals which

they take up by suction. They are not valued as a food fish because of the coarseness of the flesh, its poor flavor and the many bones.

Sucre, *Soo' kray,* or **Chuquisaca,** *Choo" ke sah' kah,* a city of Bolivia, until 1898 the capital of the republic, a revolution in this year having established La Paz as the real seat of government. Sucre is now the capital only in name. It is situated on a plateau between the La Plata and Amazon rivers, 46 m. n.e. of Potosi. The principal buildings include the president's palace, Halls of Congress, the cathedral, the mint, the town hall and the University of San Xavier. Fruit and vegetables are obtained from the surrounding fertile valleys, while the vineyards of the south supply excellent wines and spirits. Sucre was founded in 1536. Population in 1909, estimated at 23,416.

Sudan, *Soo" dahn',* or **Soudan,** a large but rather indefinite region of northern Africa lying between the Atlantic and the Nile and included between 5° and 20° north latitude. In such a vast territory the physical features and climatic conditions are varied. There are high plateaus covered with forests, barren plains, luxuriant valleys and unwholesome marshes. Fruits, cereals and spices are cultivated in many regions where the climate permits. In the interior many of the largest and fiercest of wild animals, such as lions, hyenas, elephants, jackals, etc., are found.

Politically, Sudan is of two principal divisions, Egyptian Sudan, or Anglo-Egyptian Sudan, and French Sudan, better known as the Senegambia and Niger territories. The former comprises 13 provinces, having an area of 984,520 sq. m. and a population of 2,600,000. If this British possession, now under the two flags of England and Egypt, were placed upon the United States, with its capital, Khartum, at St. Louis, its boundaries would reach from St. Paul to Memphis and from Cincinnati to Denver. It has great natural resources but insufficient population to make the best use of them. The enlarging of the Assuan Dam has already rendered the country more fertile and promises to make it an important cotton-growing region. At present the large forests and the great herds of cattle are the country's chief assets.

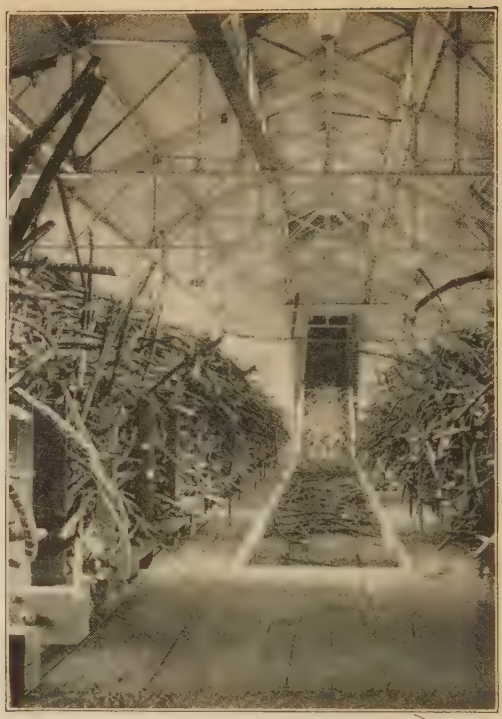
Sudermann, *Zoo' der mahn,* **Hermann** (1857-), a German dramatist and novelist, born at Matzicken, East Prussia. Like Hauptmann's, his work is among the most significant of contemporary German literature. He has produced social satires and realistic studies admirable in execution and power. His writings include *Honor, Dame Care, Sodoms, Ende, Magda, The Undying Past, Johannes, The Joy of Living, Fires of St. John* and *Der Katzensteg.*

Sue, Eugène (1804-1857), the name generally applied to Marie Joseph Sue, a French novelist, born in Paris. He studied medicine, served as an army surgeon in the campaign against Spain undertaken by France in 1823, resigned in 1829 and devoted himself to literature and socialistic agitation. His novels exerted a tremendous influence on the readers, who found a strong appeal in his portrayal of the needs and sufferings of the working classes. His style and construction were poor, but he had a command of terror even greater than that of Dumas, with whom he is frequently compared. In 1850 he was elected to the Assembly and was exiled the following year. He wrote *The Mysteries of Paris, The Wandering Jew* (widely translated), *Atar-Gull, Jean Cavalier, The Mysteries of the People* and *The Seven Capital Sins.*

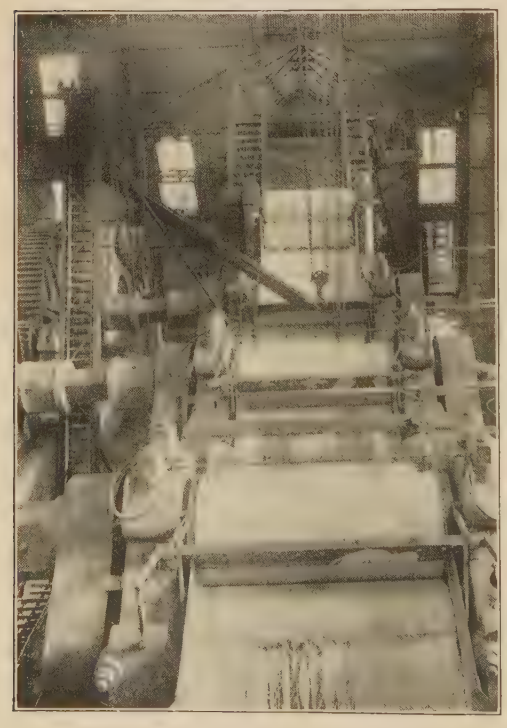
Suez, *Soo ez',* **Canal,** a ship canal connecting Port Said on the Mediterranean with Suez on the Red Sea. It was begun in 1859, but has since been enlarged. The total cost was $100,000,000. It now has a depth of 31 ft. and is 108 ft. wide on the bottom; but is much wider in various places, so that ships pass without difficulty at almost any point. It is 90 m. in length, and is therefore the longest ship canal in the world. There are no locks, and the use of powerful electric lights facilitates the passage of

SUGAR CULTURE

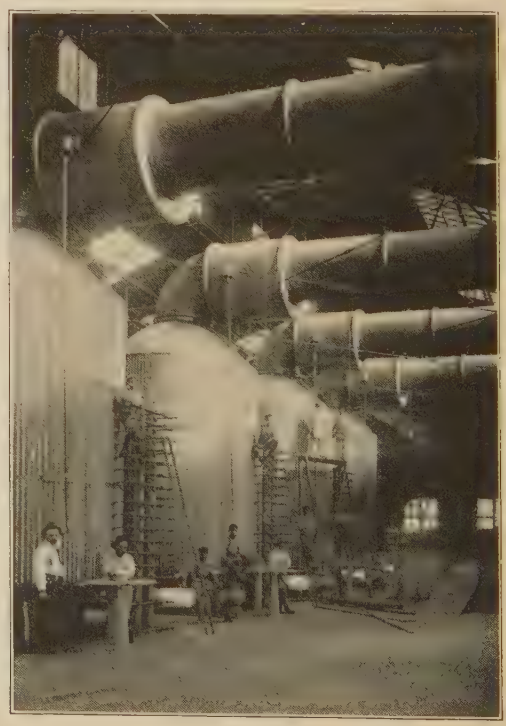
The cane is cut by hand.



At the mills the cane is unloaded onto movable platforms



The juice is extracted by crushing the cane between huge rollers.



The juice is evaporated at low temperature in vacuum pans.

MANUFACTURE OF CANE SUGAR

ships at night. The average time in the canal is about 18 hours. For about two-thirds of its length, the channel was cut through the beds of shallow lakes or through the dry docks of lakes which had disappeared. It is open to the ships of all nations; but it is used principally by the British, who now control it, since it shortens the route between England and India by 5000 m. The number of ships using the canal has steadily increased, and the annual tonnage exceeds 23,000,000 tons. See CANAL.

Suez, Gulf of, an arm of the Red Sea, the western projection of its northern extremity. It lies between the Sinai Peninsula and Egypt, and through the Suez Canal connects with the Mediterranean Sea. Its breadth varies from 14 to 39 m.; it is 187 m. in length.

Sug'ar, a sweet, easily crystallized substance found in nearly all plants and extracted from them to form an important commercial product. It is now obtained for the market from these chief sources: the sugar cane, the sugar beet and several species of maple and, locally, from the sugar-bearing sorghum.

CANE SUGAR. Until recently sugar cane has been the source of the greatest yield of sugar and still holds an important place. Since the plant is tropical or subtropical, the mills, where sugar making is begun, are mostly located in warm regions (See SUGAR CANE). The canes are taken in bundles to the mills where the juice is to be extracted and are there placed upon a movable platform, which carries them to the chutes. As fast as the canes are to be used they are taken by automatic feeders to three sets of huge rollers, so arranged that each set, which is made up of three individual rollers, presses them a little harder than the preceding one. To extract all of the juice, steam must be passed through the canes, but by doing this the juice is so diluted that it later requires more boiling, and the added expense for fuel offsets the gain for the greater amount of sugar. The crushed stalks from which the juice has been pressed are called bagasse or megass, and this is used as fuel for the engines in the evaporating houses.

The juice, which is a yellowish-green liquid having a pleasant odor, is collected to be purified and evaporated. The impurities which it contains are of two kinds: bits of tissue, fiber, dirt, etc.; and those which are chemical constituents of the sap, as albuminoids, salts and even the water itself. The first of these are removed by a simple process of straining the juice as it comes from the rollers. To prevent fermentation the liquid must be heated to a temperature of 180° F. before it is run into the great iron tanks, where milk of lime is added to coagulate the chemical impurities and to avoid changes which would affect the quality of the sugar. This process is called defecation and results in bringing to the surface all remaining impurities, which are skimmed off and set aside for further treatment, since some sugar is removed with them. During the continued boiling the sirup is "brushed" with a paddle until the bubbles are white, a sign to the sugar maker that the juice when allowed to settle will be clear and of a rich amber color.

From these tanks the juice is passed through a filter of bone black; this is a cylinder containing powdered animal charcoal, which, as the sirup passes through it, has the power of rendering the juice colorless and of taking away any remaining impurities. The final boiling to evaporate the juices begins in a set of two, three or four cylinders, known as double, triple or multiple effects; they are so constructed that the sugar is boiled in a vacuum, thus not requiring so high a temperature as if boiled under air pressure. The multiple effects evaporate about 70 per cent of the liquid and then pass the concentrated sirup on to a last vacuum pan, called the strike pan, where final evaporation takes place (See VACUUM PAN). Here the juice is constantly tested by means of proof sticks which may be removed without breaking the vacuum.

The sugar is separated from molasses, the uncrystallizable portion, by centrif-

ugal force; the combined mass is placed in a rapidly-revolving, cylindrical sieve of gauze so fine that the sugar crystals cannot pass. The revolution throws out the molasses, which is collected in troughs and carried away. The sugar crystals drop to the floor of the cylinder, from which they are collected for packing and exportation.

The by-products of cane sugar manufacture are: the bagasse, or megass, which is used as fuel and fertilizer in the cane fields; molascuit, the finer fibers from which a food for stock is made; molasses, the uncrystallizable, thick sirup used in cooking and in making confectionery; and rum, a drink prepared by introducing yeast into dilute molasses and letting it "work" for two or more days, then distilling the fermented liquor.

Beet Sugar. The source of the greatest supply of sugar at the present time is the sugar beet, which, though long recognized as containing much sugar, has only recently come into prominence as a commercial producer (See Beet, subhead *Sugar Beet*). The process of making sugar from the beet is long and expensive. The beets are brought from the fields or storehouses as required and are placed in the beet sheds of the factory. These sheds have open V-shaped floors, which connect with troughs of running water and allow a number of beets at a time to pass through them toward the chests of the cutting machines. As the beet is driven forward, it turns in all directions and so rubs off the adhering dirt. Some factories include special washers through which the beets pass, and are there hit and turned by wooden pegs, which effectually clear them of any remaining particles. The cutting machines are generally in the top of the building and consist of a series of curved knives which cut the roots in every direction.

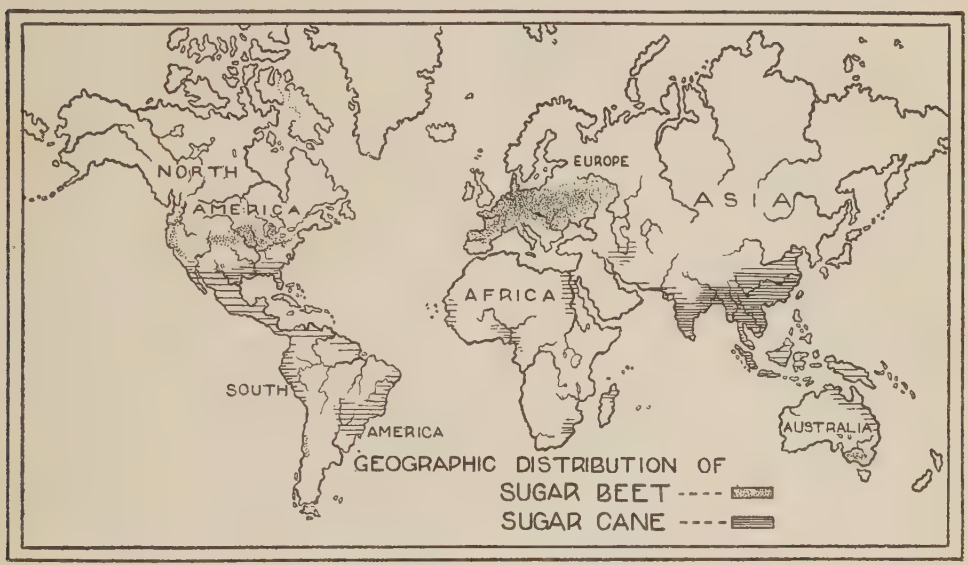
The extraction of sugar from the beets is by means of a process known as diffusion, and the next vats into which the beets, or "cossettes," pass are known as the diffusing pans. These are a set of 12 or 13 tanks into which the roots are passed and soaked in warm water. As the water is forced through, beets are added to each successive tank so that each in turn becomes the first. After about 97 per cent of the juice has been extracted, the pulp in the first tank is removed, the juice drawn off and the process of purification begun. As with the juice from the cane, there are two kinds of impurities: the solid ones, which are removed by straining or filtering; and those held in solution, which must be removed by chemical means. In order to do this, the juice must first be measured in a huge tank, from which it passes to a mixer, where it is thoroughly mixed with lime. In still another tank carbonic acid gas is passed through it, causing the impurities to solidify and settle, and the liquid, which was at first purple and muddy, to become clear and of a bright wine color. This process is called carbonation or carbonatation, and if repeated to insure perfect purification, is called double carbonation. The final steps of evaporation and crystillization are the same as for cane sugar.

The by-products of beet-sugar manufacture are: the beet pulp, which is pressed into cakes and returned to the farmers to be used as fodder and fertilizer; filter cake, the solid matter produced by carbonation, also used as fertilizer; and the molasses, which because of its unpleasant taste is not of use in cookery, but from which alcohol is made.

Forms of Sugar. Often the raw sugar, or the partially purified crystals, are sent from the mills to the large refineries to be thoroughly purified and put up into various forms for the market. There it is made into brown sugar, coffee sugar, granulated sugar, loaf sugar and pulverized sugar. There are several grades of brown sugar, differing only in amount of purification; coffee sugar is the highest of these grades and ranks next below white sugar. Granulated sugar consists of the pure sugar crystals as received from the thoroughly purified sirup and completely separated from the molasses. Loaf sugar is made by pressing the crystals into

cakes, generally cubical or oblong. Pulverized sugar is made by grinding or pulverizing other sugars, generally broken tubes, imperfectly crystallized masses, and granulated sugar which is wholly pure but for some reason not available for shipment.

Maple Sugar. The manufacture of maple sugar, while not so great an industry as the others described, is still important in the United States. The source of maple sugar is the sap of various trees, but especially of the rock, or



sugar, maple, the black, silver and red maples and the box elder, but most of the supply comes from the sugar maple. The sap is drawn by "tapping" the trees in the spring when the sap is rising to feed the new-forming buds of leaves and blossoms. A hole is made in the trunk, a spigot inserted and a pail hung beneath to catch the flowing sap. The sap is gathered daily by emptying the pails into large tubs mounted on sleds hauled by horses or oxen, and is taken to the sugar house. Making the sugar consists in evaporating the water from the sap, and while the process is similar to that in making cane sugar, it is much more simple. The apparatus, called the evaporator, consists of a shallow rectangular vessel from ten to fourteen feet long, four feet wide and about eight inches deep. The sides are of wood, and the bottom is of galvanized iron. The evaporator is divided by partitions into three sections, which may be separated from each other by valves, or all thrown together. Low partitions about two inches high and six inches apart extend about four-fifths the way across the bottom of the evaporator, each alternate partition being fastened to the opposite side, so that the sap takes a zigzag course in flowing from one end of the evaporator to the other.

The furnace consists of parallel walls of brick about three and one-half feet high. The evaporator rests upon these walls and forms the top of the furnace, which is connected with a large chimney to insure a strong draught. The evaporator is set on a slight incline, the lower end being next the chimney. A small stream of sap flows into the end of the evaporator over the fire, and by the time the sap reaches the end next the chimney it has become sirup and is drawn off at frequent intervals.

Formerly maple sugar was used on the farms where it was made, but it has

now become a luxury demanding a high price, and most of it is placed on the market in the form of sirup, which is usually put up in gallon cans. Small quantities are granulated and sold in cakes or in pails of five or ten pounds each.

SORGHUM. This member of the Grass Family resembles the sugar cane in growth and contains a sweet juice available for making sirup or molasses. It was once raised quite extensively in northern United States where sugar cane could not thrive, and the process of sirup making is similar to that employed in making cane sirup. Since sorghum sirup cannot be crystallized and since its sugar content is low compared with the cane and beet, it is of value only locally as a sirup producer. Sorghum is native in China or Africa and has some importance in those countries.

SORGHUM

HISTORY. True sugar was long in finding its present important place among the commercial products of the world. It would be difficult indeed to do without it now, and yet its common use is comparatively recent. Some sugar, of uncertain quality, was made during the time of Alexander the Great, but it is scarcely more than a generation ago that the sugar loaf was a huge block of sugar dripping with sirup, that occupied the center of the table and was chopped into smaller pieces, not as fancy dictated but as a growing necessity required. Today there are upon the market annually over 10,000,000 tons, 6,000,000 tons of which is beet sugar, and the remainder cane sugar. Besides this, much is manufactured, especially in India, for home consumption and is not placed upon the market at all. India and Arabia were doubtless the pioneers in sugar manufacture, though in the age of exploration and discovery Spain and Portugal became the chief distributors.

Recent statistics show that at the present time the chief countries in the production of cane sugar are as follows: British India and dependencies, 3,750,000 tons; Cuba, 2,967,427; Java, 1,760,000; United States, 1,105,000; China, 1,100,000. The production of sugar from beets, the second and greatest source of supply, is a constantly-increasing industry. The chief countries engaged in its production and manufacture with the amount of their annual production are: Germany, 2,755,750 tons; Austria, 1,766,215; Russia, 1,600,000; France, 811,970; the United States, 765,207.

Sugar Cane, a member of the Grass Family from whose juicy stalks sugar is extracted. The stalks, or canes, are jointed like those of the corn, which it resembles; they grow to a height of from five to fifteen or even twenty feet, and from one to two inches in diameter. Several canes spring from one root in a clump and bear grasslike leaves and plumy heads of flowers. Sugar cane was early cultivated in Egypt, Sicily and Spain, and was brought to the New World not long after the voyage of Columbus. It is raised with profit only in tropical and subtropical countries. It was long the chief source of sugar but is now being superseded by the sugar beet. See SUGAR, subhead *Cane Sugar.*

Sugar Pine. See LAMBERT'S PINE.

Suicide, *Su' i side,* the intentional taking of one's life. The most frequent causes of suicide are melancholia and alcoholism. From three-fourths to four-fifths of the cases are men. Among men the rate increases with age, but among women statistics show the rate to be highest between 15 and 20. Suicide from

a medical viewpoint is in a majority of cases considered to be due to disease of the brain. From a legal viewpoint an attempt at suicide is in some states considered a criminal offense punishable by imprisonment. In general, suicide is considered just cause for forfeiting life insurance. In most states one who aids another to commit suicide is guilty of manslaughter.

Those of sound mind and good health occasionally commit suicide. Such cases are usually traceable to business worry, disappointment and loss of some friend or relative. Surroundings and occupation exert strong influences. The largest percentage of suicides is found in military circles.

Sul'la, Lucius Cornelius (138-78 B. C.), a celebrated Roman general and statesman, born at Rome. He was of patrician birth, and became the leader of the Senatorial Party against the Democrats. He served with distinction in the Jugurthine War under Marius, and became consul in 88 B. C., after gaining renown above that of Marius in the Social War. The jealousy of Marius was so aroused by Sulla's appointment to take charge of the war against Mithridates, that the former placed himself at the head of the new Italian party, on whom the rights of Roman citizenship had been conferred. Sulla fled to his camp in Campania, and, leading his soldiers to Rome, he overthrew the party of his rival, while Marius fled to Africa. Sulla now left for the East and in four years compelled Mithridates to sue for peace. In 83 B. C. he returned to Italy, and though Marius was now dead he found that the Marian adherents were still strong in numbers. That he might thoroughly crush this party, he had himself proclaimed dictator (81 B. C.), and ordered a systematic massacre. Over 4500 Romans of wealth and position were slain. He next set about reestablishing the Senatorial rule. After ruling for three years he resigned, and died shortly after, but it was not long before his work was undone. See ROME, ANCIENT; MARIUS, CAIUS.

Sul'livan, Sir Arthur Seymour (1842-1900), an English musical composer, born in London. He studied music in Leipsic and subsequently held various distinguished professional positions. Much of his church music is of a high order, as are also his *In Memoriam* overture, the *Irish Symphony, The Golden Legend* and *Ivanhoe*. He collaborated with W. S. Gilbert in the production of many comic operas, of which *Pinafore* has the widest popularity.

Sullivan, John (1740-1795), an American soldier, born in Berwick, Me. A lawyer and an ardent patriot, he was a member of the First Continental Congress. In June, 1775, he was appointed brigadier-general, and, after having been active in the siege of Boston and in Arnold's expedition into Canada, during which he commanded on the death of General Thomas, in June, 1776, he was made prisoner at Long Island. Being soon exchanged, however, for General Prescott, he participated in the engagements at Trenton, Princeton, Brandywine and Germantown, and would have won a victory over the English in Rhode Island, in August, 1778, had D'Estaing and the French fleet cooperated with him. In the summer of 1779 he led with success a retaliatory expedition against the Tories and frontier Indians of western New York. He was elected to Congress in 1780, later was attorney-general of New Hampshire, in 1786 became president of the Commonwealth of New Hampshire and from 1789 until his death was United States district judge.

Sul'ly, James (1842-), an English psychologist, born at Bridgewater, Somersetshire. He was educated at Independent College, Regent's Park College and at the universities of Göttingen and Berlin. He became a contributor to newspapers and reviews in 1871, and for many years served as lecturer in the College of Preceptors, London. In 1892 he was appointed Grote professor of the philosophy of mind and logic in University College, London, which position he held until 1903. He belongs to the Associationist School, and has become widely

known as one of the greatest of English psychologists. Among his works are *Sensation and Intuition, Pessimism, Outlines of Psychology* and *The Human Mind: A Textbook of Psychology.*

Sulphonal, *Sul' fo nal,* a white crystalline drug discovered in 1886 and found to be useful in cases of insomnia. Taken in small quantities and not too frequently, it has no unpleasant effects. Sulphonal is an exceedingly complex chemical compound of carbon, hydrogen and oxygen, soluble in alcohol and sparingly so in water. As a soporific it is generally taken in hot milk.

Sulphur, *Sul' fur,* a highly useful element which occurs free in regions of extinct volcanoes, and, in combination with other elements, is widely distributed. The principal source of supply has been the Island of Sicily, although it is also found in Mexico, Louisiana, California and the Yellowstone region.

Sulphur exists in four forms: two crystalline and two soft and powdery. The common form, sometimes called brimstone, is a pale yellow, brittle, crystalline substance which is not soluble in water. It conducts neither heat nor electricity. One of its powdery forms is commonly called flowers of sulphur, the other, milk of sulphur. Sulphur combines easily with so many substances that its compounds are numerous and many are familiar. It is a constituent of eggs and the offensive odor of rotten eggs is due in part to hydrogen sulphide formed in the process of decay. Combined with rubber, sulphur forms the hard vulcanized rubber. It has limited use in medicine as a germicide, and is consumed largely in the manufacture of sulphuric acid, which is among the best-known and most-used acids. Zinc sulphate and copper sulphate, known respectively as white and blue vitriol, are used in the arts. Sulphur dioxide, or the smoke of burning sulphur, is very useful as a bleaching agent. See SULPHURIC ACID.

The working of the sulphur deposits in Louisiana has caused great loss to the mine owners of Sicily. In Louisiana the sulphur lies below the surface of the ground and a process has been invented of there liquefying the sulphur by means of superheated water. The liquid sulphur is then pumped into bins having a capacity of about 3750 cu. ft. each; here it hardens to the consistency of sandstone and later is broken by blasting for shipment. This sulphur was estimated to be 99½ per cent pure, but the average proves to be even above the estimate.

Sulphureted Hydrogen, *Sul' fu ret" ed Hi' dro jen,* **Hy"drosulphu'ric Acid** or **Hy'drogen Sul'phide,** an inflammable gas produced by the decomposition of organic matter containing sulphur or by burning sulphur vapor in hydrogen. It is colorless, with a sweet taste but a nauseous odor, like that of rotten eggs. It is found in many of the sulphur springs. When breathed it has injurious effects, and its presence in the air is detected by exposing filter paper previously soaked in a solution of the acetate of lead. If sulphureted hydrogen is present in any quantity the paper will turn black.

Sulphuric, *Sul fu' rik,* **Acid,** a heavy, oily liquid, colorless when pure and having great affinity for water, which leads to its use as a drying agent. The sulphuric acid of commerce, oil of vitriol, generally contains about 40 per cent of water, and even the highly concentrated solution contains two per cent. It can be obtained pure only in crystalline form.

Sulphuric acid has been most commonly prepared by a complicated process, the basis of which is the heating of sulphur or iron pyrites in the presence of nitric acid. The sulphur or pyrites are roasted in ovens, and thus sulphur dioxide is formed. This gas is carried to lead-lined chambers where nitric acid and steam are made to act upon it, forming the sulphuric acid which collects upon the floor. This process is now being supplanted by the "contact process," which is much simpler. This consists in bringing sulphur dioxide and oxygen together in the presence of platinum. The platinum acts as an agent

causing the two to unite, the product being brought into contact with water.

Sulphuric acid was discovered by Basil Valentine, an alchemist who lived some time between the 12th and 15th centuries, and it has been used extensively ever since in arts and manufacture. It is a remarkable drying agent and has long been in use in many manufactures.

Sulu' Islands, a group of islands lying between the Philippines and Borneo. The Celebes Sea washes their shores at the south and the Sulu Sea lies to the north. The islands number about 190 and are mostly volcanic in formation; geographically, they range themselves in six groups. They are heavily forested, and teak and sandalwood form valuable products. Bananas, oranges, coconuts, breadfruit, mangoes and areca nuts are the principal fruits, and the natives cultivate maize, rice and cocoa. Ambergris, the Sulu pearl, or pearl shell, and resin are products that are valued commercially. Domestic animals are raised for home use. The natives of the islands are Malays who are governed by chiefs under the direct authority of a sultan. Late in the 19th century Spain claimed the entire archipelago, but in 1899 the sovereignty of the United States was acknowledged. The area of the islands is about 1000 sq. m. and their population about 60,000.

Sulu Sea, that part of the Pacific Ocean lying between Borneo and Palawan, Mindanao and others of the Philippine group. The Sulu Islands separate it from the Celebes Sea, while numerous groups of small islands dot its surface. Near the coast of Mindanao its depth reaches 16,000 ft. Straits separating the various island groups connect this sea with the Pacific and the South China Sea. The Celebes Sea, Mindanao Sea, etc. are really partly separated sections of this sea. The Sulu Sea is sometimes spoken of as the Sea of Mindoro.

Sumac, *Soo' mak,* or **Sumach,** a shrub of the Cashew Family, native in the United States and known by two principal species, the poison sumac and the staghorn sumac. The former is a tall, slender shrub found near swamps in the North. The bark and leaves contain an acid juice poisonous to the touch of most people. The leaves are made up of from 7 to 13 oval leaflets which are beautifully marked with purple veins. The inconspicuous flowers are in slender clusters, greenish-white in color, and have five petals and five stamens. The peculiarity of this species of sumac lies in the fact that it is sometimes poisonous and sometimes not, or often poisonous to one person and not to another.

The staghorn, or velvet, sumac is familiar on hillsides of the North. It is a taller, more treelike shrub, whose crooked branches, stripped of their leaves, are supposed to resemble a stag's horns. The leaves are much like those of the first-described species. The flowers, however, are borne in a long, erect spike in the early summer and are followed in the autumn by compact masses of reddish-purple fruit. This sumac spreads so rapidly by means of suckers that whole hillsides are quickly covered with the shrubs, and these in the first or second autumn of their growth present a pleasing appearance. The wood of this sumac is brownish-yellow, but not of great value.

Sumatra, *Soo mah' tra,* the next to the largest of the Sunda Islands, lying in the Indian Ocean south of the Malay Peninsula. It is long and narrow and has an area of 180,000 sq. m. and a length of 1050 m. It is separated from the Straits Settlements of the peninsula by the Strait of Malacca, and from Borneo by the Strait of Sunda. A long mountain chain, having some active and many extinct volcanoes, traverses Sumatra from east to west and bears forests of valuable wood, as teak, oak, pine, camphor and gutta-percha. The soil is, in general, fertile, and tropical fruits are abundantly produced. Tobacco and pepper are the chief exports, and coal, copper, gold, lead, iron and tin are mined in the mountains. Sumatra boasts of several large navigable streams and one lake of some importance, Lake Toba.

The island has been a Dutch possession since 1600, but has not been easily governed. Recent explorations have located in the interior an isolated tribe of Kubus, said to be the most primitive of human beings; in habits and customs they are not far removed from the anthropoid apes, and they are said to be destitute of even rudimentary religious beliefs. The greater part of the population, however, consists of Malays, although there are many Chinese, Europeans and other foreigners. Palembang, Padang and Achin are the chief cities. Population, 4,029,500.

Sum'mer, the season of the year beginning when the sun enters the sign Cancer at the summer solstice, about June 21, and continuing for about 93.6 days until the sun reaches the autumnal equinox, about Sept. 21. At the summer solstice the sun has reached its greatest height and begins its descent. The days grow shorter and the nights longer, reversing the process of the ascent from the vernal equinox. But the days continue to be longer than the nights, so that the earth cools slowly, and summer lingers. See SPRING; SEASONS.

Summer Yellowbird. See WARBLER, subhead *Yellow Warbler.*

Sum'ner, Charles (1811-1874), an American statesman, born in Boston, Mass. He graduated from Harvard in 1830, was admitted to the bar in 1834, and in 1836 published *Sumner's Reports,* three volumes containing decisions of Judge Story. Besides, he edited a quarterly periodical called the *American Jurist.* The following year he visited Europe, traveling on the Continent and residing for nearly a year in England. Here he was cordially welcomed through an introduction from Judge Story, and was presented in Parliament. Returning to Boston and to legal practice in 1840, he first participated in active politics in 1845, and on July 4 of that year he delivered his famous oration on *The True Grandeur of Nations.* This address made him conspicuous among the public men of the country, and another of his orations of about this same time, which denounced war, led to considerable controversy in America and Europe. He then took up the anti-slavery cause, opposing the annexation of Texas, joining the Free-Soilers and supporting Van Buren for the presidency. In 1851 he was elected United States senator by a coalition of Free-Soilers and Democrats, holding this position until his death and filling the vacancy of Daniel Webster.

Sumner's political actions being guided by the idea that "Freedom is national, Slavery is sectional," he was very prominent in debates on the Kansas question. Some passages in his speech on *The Crime Against Kansas,* which it took him two days, May 19 and 20, 1856, to deliver, incensed members in Congress from the slave-holding states. In consequence he was violently assaulted by Preston S. Brooks of South Carolina. His injuries caused him to withdraw from public life for four years and led eventually to his death. Later he supported Lincoln and Hamlin, and from 1861 to 1871 was chairman of the Senate committee on foreign relations. That year, for opposing the annexation of Santo Domingo, President Grant caused his removal. Meanwhile Sumner advocated the "state-suicide" theory of reconstruction (See RECONSTRUCTION), opposed President Johnson, originated the Civil Rights Bill and voted to impeach the President. Later he left the Republican Party and supported Horace Greeley for the presidency, opposing General Grant's renomination.

In a review of Sumner's public career, Senator George F. Hoar of Massachusetts said: "If to be a great statesman is to deal with questions of greatest moment to the state, to know what are its governing forces, to retain his hold on these forces,—to cause sound principles of action—in the government—in great emergencies, to adapt his methods to the condition of things by which he is surrounded,—to accomplish great and wise public ends by great and wise

means—if this be statesmanship, then was Charles Sumner a great statesman."

Sump'tuary Laws. The word *sumptuary* means to limit or regulate expense or expenditure. The term *sumptuary laws,* therefore, refers to those legislative acts which restrict by law private expenditure where it is deemed injurious. An example of sumptuary laws are those which limit the expenses of citizens in the matter of clothing, food and the like. In colonial days, before the formation of the Federal Government, sumptuary laws were in force in nearly all the colonies, but today they are rarely found on any statute book. Instead of limiting expenditures for necessities the modern legislative act places a tax on luxuries, which practically reverses the custom which prevailed in the older times.

Sum'ter, S. C., a city and the county seat of Sumter Co., 43 m. s.e. of Columbia, on the Southern, the Atlantic Coast Line and other railways. It is the central market of a highly productive cotton and tobacco district and has an extensive trade in these commodities. Large quantities of vegetables also are grown and shipped. In and near the city are several cotton and cotton-seed-oil mills and a cotton compress; also telephone factories, lumber mills and a casket factory. At Sumter is located St. Joseph's Academy, a Roman Catholic school for girls. The city was founded in 1800 and named in honor of Gen. Thomas Sumter; in 1887 it received its charter. Population in 1920, 9508.

Sumter, Thomas (1734-1832), an American soldier and partisan commander, born in Virginia. At the outbreak of the Revolution he became lieutenant-colonel of a South Carolina regiment; but he saw little active service till the summer of 1780, when his guerrilla campaign earned him the sobriquet "Game Cock." After the war he sat in the Federal Congress and the United States Senate, and was minister to Brazil. Sumter was the last surviving general officer of the Revolution.

Sun, one of the fixed stars, the center of the solar system and the source of light, heat and life upon the earth. To the inhabitants of the earth and the other planets, if they contain inhabitants, the sun is the most important of the heavenly bodies. It not only sends forth heat and light sufficient to sustain life, but because of its great size it exerts a power of attraction which holds them in their orbits. The sun is 866,000 m. in diameter; thus its diameter is 110 times that of the earth. Were the sun so placed that its center would be at the center of the earth, its surface would be as far beyond the moon as the orbit of that satellite is from the center of the earth. Its weight is 326,000 times that of the earth, and in volume it would take 1,300,000 earths to equal the sun. A man transferred from the earth to the sun would weigh there 27 times as much as on the earth; that is, a man weighing 200 lb. on the earth would weigh 5400 lb. on the sun, and would doubtless be crushed by his own weight. The mean distance of the sun from the earth is about 93,000,000 m. It would take an express train traveling day and night at the rate of 60 m. an hour nearly 236 years to traverse this distance.

Astronomers divide the sun into three parts: the central photosphere, which forms the disk; the luminous chromosphere surrounding the photosphere; and the corona, or outer atmosphere, seen only during a total eclipse. The interior of the sun is invisible, but the photosphere, when seen through the telescope, shows dark spots, which seem to be openings into the interior. Some of these chasms are more than 100,000 m. across and of unknown depth. By studying these spots, considerable has been learned about the surface of the sun. The chromosphere is composed of burning hydrogen, and flames thousands of miles high are sometimes seen to leap up through this burning mass. The spots are most numerous in two zones, whose positions correspond respectively to that of the north and south temperate zones on the earth. The part of the sun in

which the spots are most numerous turns upon its axis once in about 26 days, while the portions nearer the poles revolve more slowly, a proof that the sun is in a gaseous state; its condition, however, is not thoroughly understood by astronomers.

When viewed through the telescope, the surface of the sun is not equally bright in all parts, and, in general, it presents a mottled appearance, which has been compared by some to a surface thickly covered with leaves. A small telescope, or even a field glass, is of great assistance in viewing the sun, but these should never be used without placing a densely-smoked glass between the eyepiece and the eye of the observer, for otherwise the eye will be permanently injured. By darkening a room and pointing a small telescope at the sun through a shutter, and placing a disk of cardboard in front of the eyepiece and holding it far enough away to secure a large image of the sun, the spots are usually distinctly seen.

The amount of heat given off by the sun is largely a matter of conjecture. The temperature at its surface is infinitely higher than any temperature that can be produced by the ingenuity of man, and we must remember that only a small part of the light and heat given off is received by the earth. Someone has estimated that the heat given off in a year would melt a shell of ice 177 ft. thick over the entire surface of the earth. The spectroscope shows the sun to contain at least 36 elements, all of which are found in the earth's crust. The most important are iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, hydrogen, zinc, sulphur, cerium, strontium and potassium. See SOLAR SYSTEM; STARS; SPECTROSCOPE; TELESCOPE.

Sun Bear. See BEAR.

Sun'bird", a name given to a group of small birds living in Africa, Asia and Australia. They are very slender, have long, slender, somewhat curved bills and brilliant, metallic colors. They live on insects, which they secure from flowers in much the same manner as do the humming birds. The nests are nearly spherical, with a hole in the side, and are attached to or hung from a twig, or on the end of a leaf. Three white, greenish-speckled eggs are laid. Over 100 species are known. A species from Natal is velvety-brown above and black below, with a scarlet breast. The top of the head is bluish-green and the throat is green, with golden reflections. Several species have the two center tail feathers very much elongated.

Sun'bury, Pa., county seat of Northumberland Co., 54 m. n. of Harrisburg and 157 m. n. of Philadelphia, on the east bank of the Susquehanna River, 1 m. below its junction with the West Branch, and on the Pennsylvania and the Philadelphia & Reading railroads. The Mary M. Packer Hospital is located here. Sunbury was founded in 1772 on the site of an old Indian village, and of Ft. Augusta, built in 1756, during the French and Indian War. The town was first incorporated in 1797. The chief manufacturing establishments are woolen and silk mills, foundries, machine shops, dye works, nail factories, a rolling mill, sash and blind factories and coffin works. Sunbury is an important commercial center for a large region. Extensive coal shipments are also made from this place. A small stream separates Sunbury and East Sunbury. Population in 1920, 15,721.

Sun'da Islands, a name applied to those islands of the Malay Archipelago which separate China Sea from the Indian Ocean and extend west of the Molucca and Banda seas. Sumatra, Borneo, Celebes, Java, Flores, Bali, Lombok, Lesser Sundas and Timor are some of the islands belonging to the group. They are named from the Sundanese, a Malayan people coming from the western part of Java.

Sun'day, the first day of the week, generally observed by Christians as a holy day in commemoration of the Resurrection of Christ. The word *Sunday* is of Saxon origin, and means day

of the sun. Sunday was definitely established as a holy day before the end of the apostolic period, and by the beginning of the fourth century the Church had formally decreed that the first day of the week be observed as sacred. The Emperor Constantine confirmed the custom by a State decree. In the United States the question of Sunday observance is settled by local legislation, as the Federal Constitution prohibits the enforcement of religious observances. Aside from the religious aspect of Sunday observance, it has been found that rest from labor on one day in seven is of great economic importance, conducing greatly to the welfare of man.

Sunday Schools, schools usually organized in churches for the purpose of Bible study. They are also called Bible schools. All religious denominations have classes in which religious instruction is given, but the term *Sunday School,* as ordinarily used, applies to Bible schools in Protestant churches only. The origin of these schools is due to Robert Raikes of Gloucester, England, who employed women engaged in teaching day schools to gather the children of poorer classes on Sunday and give them instruction, a part of which was religious and a part secular. At first the movement met with opposition. Those within the Church thought it interfered with the proper observance of the Sabbath, and those without that it interfered with the home duties of the children. Nevertheless the movement grew rapidly. A council of bishops was called to stop it, but before the council met, the movement was beyond its control, and Sunday Schools spread throughout the world. Before Raikes died in 1811 there were over 400,000 children in Sunday Schools in Great Britain alone.

The first Sunday School in America was opened in Philadelphia in 1790. The first organization for promoting the work was formed in New York in 1816. In 1824 the American Sunday School Union was organized, and in 1832 the first national Sunday School Convention was held. In 1872 this convention at its annual meeting adopted a uniform system of Sunday School lessons. This was followed by the publication of the *International Series of Lessons.* In 1875 an international convention was organized, out of which has grown the International Sunday School Association, which maintains adult, elementary and teacher-training departments, each in charge of a trained superintendent and all under the general direction of the international secretary. The international convention meets once in three years, and there is also a world's convention, which meets once in four years. The next international convention will be held in Kansas City in 1922.

In the United States most of the Sunday Schools in counties form a county organization, which holds at least one convention a year. There is also a state organization in nearly every state, and the larger states employ a superintendent or secretary, who is a Sunday School expert, and gives his time to promoting the work in his state. Graded lessons for primary, junior and intermediate departments are in general use by all denominations; thorough courses for training teachers have been prepared by the International Association; and there are teachers' training classes in many schools.

In 1918 there were in the United States 195,275 Sunday Schools having 1,959,918 teachers and 19,951,675 pupils. Canada had 10,604 schools, 85,000 teachers and 854,000 pupils. In the world there were 296,129 schools, 2,633,120 teachers and 26,654,000 pupils.

Sun'dews", a class of curious marsh plants belonging to the Sundew Family and found wherever there are low, swampy grounds; occasionally they are entirely water plants. Their chief characteristics are their need for animal food and their method of procuring it. The round-leaved sundew is the most common in this country. It has at the summit of the root a circle of slender-stemmed leaves from which ooze drops

of a sticky liquid that attract insects and hold them fast until the leaves curl about them and absorb them. The flower stalk is tall and slender and somewhat branched. The flowers are set in a row along these branches and open, a few at a time, in the sunlight. They are small white flowers, inconspicuous but pretty. The thread-leaved sundew has narrower leaves which have coarse, gland-bearing hairs for the purpose of entrapping insects. It has pinkish flowers, larger than those of the preceding species. The wild sundews, though widely scattered, are rather scarce, but from their interesting habits are often found in greenhouses. Without animal food the plant is short-lived. See VENUS'S FLYTRAP.

Sun'di"al, a device for indicating time by a shadow cast by the sun. It is of two parts: the plane, or face, and the gnomon, sometimes called the finger, which is set pointing to the North Star. The dial is divided around its face into spaces for hours, half hours and quarter hours, and its center is occupied by the gnomon, made usually of a strip of metal set on edge, inclined and so shaped that its shadow becomes the pointer that falls on the divisions of the dial to denote the time as the sun moves over the heavens. It is the oldest device for measuring time, but since clocks have been invented it is seldom used. See CLOCK.

Sun'fish", a family of small, bright-colored fishes, all of which inhabit fresh waters and are the joy of the youthful fishermen. Among its numbers are the blue sunfish, or blue gill, the bass, perches and crappies. The distinguishing characteristics of this family are the symmetrical, compressed body, terminal mouth, scaly cheeks and gill covers and the single dorsal fin. Of the true sunfish there are four species, technically referred to as the blue, the long-eared, the redbreast and the common. The first is the largest and is found in all waters of the Mississippi Valley, where it is variously called blue gill, blue bream and copper-nosed bream. It is an excellent game and food fish. The length of the blue gill is rarely more than one foot.

The long-eared, or tobacco-box, sunfish is of handsome coloration and has large, black, red-bordered "earflaps," which give it its name. Its body is short and deep with a decided hump upon its back. This fish is no more than six or eight inches in length and is found in streams from Michigan to Mexico. The redbreast sunfish is an inhabitant of coastal streams from Maine to Louisiana. Most prized of all, however, is the common sunfish, or sunny, whose flashing, golden body, quick, graceful movements and readiness to bite make up to the young angler for its small size and numerous bones. It is found from Maine to Florida and west through all the waters of the Mississippi Valley. Excluding head and tail the body is nearly circular, and with its gorgeous coloring of red and gold may well be likened to the sunbeam in the water. Older fishermen slurringly speak of it as the pumpkin seed.

All sunfish are variable in color and change their hues with changing conditions of temperature, health and food.

Sun'flow"er, a well-known member of the Composite Family, growing in all sizes from the small, wild sunflower scarcely 12 inches in height to the giant garden sunflower which often attains a height of 20 ft. The stems of the latter, which are thick and fibrous and covered with bristly hairs, are in some places used as fuel and are useful in the production of potash. The leaves are rough and heart-shaped, and often attain great size. The flowers are borne closely on a flattened disk called the receptacle, which is surrounded by numerous leaflike bracts. These flower heads sometimes exceed a foot in diameter, but may be tiny and delicate. Closely surrounding the flower heads is a row of bright yellow rays, which seem to draw their color from the sun, toward which they continually turn. The little flowers are of two kinds: those at the outer portion of the disk are narrow and

flat; those nearer the center are tubular. All contain a great deal of honey. The fruit is a flattened, angular seed, rich in an oil which was once supposed to be of almost as great nutritive value as olive oil. At present the seeds are of use only as food for cattle and poultry.

Other varieties of sunflower are smaller and more delicate. The wild sunflower, which is the state flower of Kansas, grows in profusion in the West and South. It is a handsome flower, noticeable on account of its golden-yellow color. A swamp sunflower is also a low flower growing along the coast or from Illinois south. In Peru the sunflower was the sacred flower of the sun-worshipers and was embroidered upon the robes of the priestesses and copied upon the walls of their temples.

Sun'stroke", a sudden illness, due to exposure to sun or other heat. It may have the effect of heat prostration or heat exhaustion, or may come on more suddenly as heat stroke, or sunstroke proper. Heat prostration causes great weakness, faintness and nausea, followed by a fall of temperature. If the last symptom appears, artificial stimulants and hot application should be used. The victim of sunstroke falls unconscious from the heat, and his temperature may rise to 115° F. Perspiration flows freely, and the body becomes red. Temperature should be reduced with sponge baths of iced water and the patient should be wrapped in blankets. If the temperature again rises the same cooling process should be repeated.

Sun' Yat'-Sen' (1865-), the first president of the provisional Republic of China, born near Canton, of Chinese parentage. In his boyhood he was taken to Hawaii to be educated, and there became a convert to Christianity. Later he studied medicine at Canton and at Hongkong, and, after receiving his diploma in 1892, began to practice medicine in Macao. It was here that he became actively interested in the "Young China" movement, and it was not long before he was compelled to leave China to escape arrest. After visiting Honolulu and San Francisco, he took up his residence in London (1896), where for a time he was held a prisoner at the Chinese legation. His release was secured by the British authorities, however, and Dr. Sun now devoted his entire time to the overthrow of the Manchu rule.

He traveled, secretly drilled Chinese recruits in the United States and visited numerous cities to collect funds for the furtherance of the revolution. After years of untiring devotion to the cause, he saw the downfall of the old monarchy and the establishment of a provisional republic (See CHINA, subhead *History*). In December, 1911, a provisional convention elected him president of the new republic, and he held office until February, 1912, when he resigned to give place to his successor, Yuan Shih-Kai.

Dr. Sun typifies the spirit of the new China, and is justly considered the father of the Chinese Revolution. He is a keen student of economics, an eloquent orator and a writer of ability, and, though he has the zeal and enthusiasm of a young patriot, he is not lacking in foresight and wise conservatism. See YUAN SHIH-KAI.

Supe'rior, Wis., a city, port of entry and county seat of Douglas Co., adjacent to Duluth, 140 m. n.e. of St. Paul and Minneapolis, Minn., on Superior, St. Louis and Allouez bays at the head of Lake Superior, at the mouth of the St. Louis and Nemadji rivers, and on the Great Northern, the Chicago, St. Paul, Minneapolis & Omaha, the Northern Pacific, the Duluth, South Shore & Atlantic, the Chicago & North Western, the Wisconsin Central, the Soo Line and other railroads. Superior is connected by ferry and by road and railway bridges with Duluth, and shares with that city one of the finest natural inland harbors in the country. The city is finely situated on rising grounds overlooking the bays, and has an area of 42 sq. m. and about 29 m. of harbor front, comprising the ports known as East End and West End.

The most noteworthy structures are the Federal Building, municipal buildings, national and state banks, theaters, hotels and substantial business blocks. There are a large number of churches and the city is the seat of a Catholic see. Among the educational institutions are a state normal school, Finnish University, several high schools, public and parochial schools, two business colleges and a Carnegie library. The benevolent and charitable institutions include St. Mary's, St. Francis and the Woman's Christian Temperance Union hospitals.

Superior is an important grain market, and the great quantities of coal brought by lake vessels are distributed from this point throughout the American and Canadian Northwest. Other shipments include iron ore and flour. The city is one of the greatest ore-shipping points in the world. The principal manufacturing establishments include iron and steel works, railway-car works, a chair factory, cooperages, furniture factories, wagon and carriage works, flour and grist mills, foundries, bag factories, cement works and manufactories of windmills, mattresses and wire beds, gas engines, woodenware, lumber products, including lath and shingles, and meat products. The shipbuilding interests are important, and among steel ships the type known as the "whaleback" originated here. Launches, motor boats and other small craft are also built. There are immense coal docks and grain elevators.

In 1820 the Hudson's Bay Company established a trading post here, but no permanent settlement was made until 1853, when a syndicate of capitalists bought lands here and platted a town which was called Superior. West and South Superior were laid out about 1884. The place was incorporated as a village in 1887, including West and South Superior. A city charter was granted in 1889. Population in 1920, U. S. census, 39,624.

Superior, Lake, the largest body of fresh water on the globe and the most northerly and westerly of the chain of Great Lakes, situated a little to the northeast of the center of North America. It is bounded on the n. by the Province of Ontario, on the w. by Minnesota and on the s. by Wisconsin and Michigan. It is 390 m. long and 160 m. wide, and its area is 31,200 sq. m., a little more than that of South Carolina. It is 602 ft. above sea level and 20 ft. above Lake Huron. Its greatest depth is 1008 ft., so that the lowest point in its bed is over 400 ft. below sea level. The shores are bold and rocky, except along the southeastern border, where they are low and sandy. On the south shore are the famous Pictured Rocks, which are cliffs of sandstone from 50 to 200 ft. in altitude and which have been worn into fantastic forms by wind and wave. The highest point on the lake is Thunder Cape on the north shore, which has an altitude of 1000 ft. There are a number of islands bordering the shores. The largest of these is Isle Royal, 45 m. long. The largest inlet is the St. Louis River, which enters the western extremity and is considered as the beginning of the St. Lawrence River system. The St. Mary's River connects Lake Superior with Lake Huron. The water of Lake Superior is remarkably pure. Except on the surface it never reaches a temperature above 39° and the lake never freezes except along the shores. See GREAT LAKES.

Supply' Ship, a tender upon a war fleet. The supplies carried by these vessels include food and such other necessities for the fleet as are not provided for by special supply ships, such as colliers, for coal; ammunition ships, especially equipped for handling ammunition quickly and safely; and repair ships, carrying tools and specialties for repairing vessels that may be damaged. Supply ships are equally as important in the navy as the base of supplies in the army. See NAVY.

Supreme' Court, the highest court created by the Constitution of the United States. When established in 1789 it consisted of one chief justice and five associate justices. It now consists of

one chief justice and eight associates, the chief justice receiving a salary of $15,000 and the associate justices $14,500 each annually. The term of office is practically for life. The members are nominated by the president and confirmed by the Senate, and Congress has provided that after serving ten years and reaching the age of 70 they may be retired on full pay. The sessions of the Supreme Court are held in the Capitol in Washington, D. C., from October to July in every year. This court has original jurisdiction in all cases relating to ambassadors and other public ministers and consuls and in those to which a state is a party. It has final jurisdiction in admiralty, patent and copyright cases and has power to declare void acts of Congress or of a state Legislature which are in conflict with the Constitution.

A rule of the Supreme Court requires the presence of six judges in order to pronounce a decision. Every case is discussed twice by the whole body. After the first discussion one of the judges is selected to set forth the conclusions of the court in a written opinion, and the case is again discussed when this opinion is submitted for criticism and adoption.

Sur'face Ten'sion, that property of the surface of a liquid whereby it acts like a stretched elastic membrane. It is due to surface tension that drops of a liquid always tend to become spherical, thus making the total film as small as possible. The phenomena of surface tension are beautifully exemplified in soap bubbles and in the rising of liquids in capillary tubes. Surface tension is explained as occurring because the minute particles or molecules of the liquid very near to the surface are attracted more strongly toward the main body of the liquid than toward the surface; this inequality of attraction is the greater, the more convex the surface. Thus the total effect is the same as if there were an outside pressure exerted upon the surface of the liquid, the pressure being greatest at the most convex parts of the surface. See CAPILLARITY.

Surgeon, *Sur' jun,* **Fish,** a small family of sea fishes of warm climates. The members of this family are especially distinguished by the presence of a sharp, lancelike spine near the tail, which, when not in use, is covered by a protective sheath. This knife, or blade, is capable of inflicting serious wounds, and the fish cannot be handled with impunity. The surgeon fish has a wide, compressed body, long dorsal fin and a large head. The eyes are also large and are set very high, making the mouth look correspondingly small. The color of the fish is ordinarily a dull brown. The surgeon fish is a native of Europe but is found in the East and West Indies; three species, found in American waters, are locally called the lancet fish, doctor fish and tang.

Surgery, *Sur' jer y,* the art of healing by removing the affected part, generally by cutting. The practice has long been made use of, but owing to lack of knowledge of anatomy and of bacteria, the attempted cure was liable to be more fatal than the disease. The Greeks early practiced the art, which was considered wholly separate from that of medicine, and passed it on to the Romans. With the discovery of the use that could be made of anæsthetics, and especially of chloroform and ether, in surgical cases, the scope of surgery widened, since operations could then be performed which heretofore entailed too great suffering. Blood poisoning, however, was still a great foe to surgical work, until Pasteur formulated and established the germ theory of disease and showed that wounds kept clean of bacteria tended to heal almost unassisted.

At present, surgery is one of the great departments of medical science, and the profession is one which has attained the widest importance. Doctors and nurses are especially prepared for this line of work and hospitals and offices are fitted with operating rooms, where the highest conditions of sanitary cleanliness are possible. All bandages, instruments, fixtures and the hands and faces of the surgeons and attendants are ster-

ilized so that no chance of infection may be possible. Special departments of surgery include treatment of eye, ear, nose, throat, brain, stomach, intestinal and cancerous diseases; and surgeons frequently fit themselves for one or more of these lines of work.

Surinam, *Soo" ri nahm'*. See GUIANA, subhead *Dutch Guiana.*

Sur'rey, Henry Howard, EARL OF (about 1517-1547), an English soldier and poet. In 1541 he was made Knight of the Garter, and soon distinguished himself in the English army in France. In literature his chief services consisted of a translation of the *Æneid,* where he introduced into English a form which later grew significant, namely blank verse. He also introduced the sonnet into England, using the Italian form as a model, but making such changes as were necessary to adapt it to the English tongue. See WYATT, SIR THOMAS.

Surveying, *Sur va' ing,* the science of computing areas upon the earth's surface, laying out their boundaries, discovering their contour, physical conditions, etc., and delineating them on a small scale upon paper. Its general purpose is the making of maps, locating buildings, towns, etc., and laying out roads. Plain surveying deals with small areas which are of such extent that the curvature of the earth is not considered. A topographical survey is the plotting of more extended tracts of the coast, land or bodies of water; it also includes physical conditions, but because of its extent must take into consideration the curvature of the earth. Marine surveying is for the purpose of locating shoals, dangerous and safe channels, rocks, etc. Surveying is done by means of principles of geometry and trigonometry.

Susquehanna, *Sus" kwe han' na,* **River,** a river of the United States. It is formed by two forks which issue respectively from lakes Schuyler and Otsego in Otsego County, N. Y. It flows southwestward to the Pennsylvania boundary, then crosses that state in a zigzag southward course and enters Chesapeake Bay at its head. It cuts its way through several ranges of the Appalachian Mountains, forming interesting and beautiful gorges. It also contains a number of rapids. It is about 500 m. in length.

Swal'low Family. The Swallow Family is represented in almost all parts of the world, though the species are more numerous in warmer countries. Over 100 species are known, of which upwards of 30 live in America. The swallows are of great value to the agriculturist, as they very effectually police the air, capturing their insect prey on the wing, for which occupation nature has peculiarly fitted them by providing long, narrow wings for quick flight.

BARN SWALLOW. The barn swallow is perhaps the best known. It is smaller than the robin and is easily recognized by its purplish-blue upper parts, chestnut or cinnamon under parts, and white and much elongated outer tail feathers forming a deeply forked tail. The nest is made on a rafter of a barn or shed. It is a semicircular structure made of mud, mixed with sand, and lined with hay and feathers. Occasionally the nest is built in an old bridge. Three to five eggs, spotted with brown and lavender, are laid. Usually two broods are raised in a season.

EAVE SWALLOW, or CLIFF SWALLOW. This swallow builds its nest in old barns under eaves and on the face of a cliff. The nest is a curious structure made of pellets of mud fastened together with straw and an adhesive substance supplied from the saliva of the bird. It is shaped something like a retort. The natural nesting place is the face of a cliff, where these birds gather in large numbers. When seen from a distance, the nests here look like huge wasps' nests. Three to five brown-spotted eggs are laid. This beautiful bird may be known by its dark blue head, its crescent-shaped, white forehead mark, its brick-red rump, chestnut throat, white abdomen and almost square tail.

BANK SWALLOW. This bird is about the size of the English sparrow and is grayish-brown above and whitish below,

with a grayish-brown band across the throat. The nesting site is a sand bank, the face of which frequently becomes entirely filled with holes made by this swallow. The tunnel is from 20 to 48 inches in length; at the inner end a chamber is made for the nest, which is lined with grass and feathers. Three to six white eggs are laid. The bank swallow ranges from Peru to the Arctic regions.

Swamp Angel. See THRUSH, subhead *Hermit Thrush.*

Swan. Swans belong to the same family as the duck and goose. They are characterized by heavy bodies, long necks, with small heads, short legs, placed toward the hind end of the body, and webbed feet. The body beneath the feathers is thickly covered with down, which is thicker on the underside. Swans live in nearly all parts of the world, breeding in high latitudes, where they build a nest of moss, grass or leaves near the water, and lay five to seven dull-white eggs. The young are covered with gray down until the second year. Swans are usually pure white, but a South American species has a black neck, and a species found in Australia is black. The European swan is the common swan seen in zoological gardens and in private estates. The whistling swan and the trumpeter swan are common in America. The former is over four feet long; the latter, about a foot longer.

Sweat, *Swet.* See SKIN.

Sweat'ing Sys'tem. See FACTORY.

Swe'den, a kingdom of northern Europe, the eastern and larger part of the Scandinavian Peninsula. It extends from 55° 20′ to 69° 3′ north latitude and from 11° to 24° east longitude; it is bounded on the w., n. and e. by Norway, Finland and the Baltic Sea, and is separated from Denmark on the w. by the Cattegat. The total area is 172,876 sq. m., equal to the combined area of California, Delaware and Maryland. It has a coast line of over 1400 m.

SURFACE, RIVERS AND LAKES. That portion of Sweden which lies along the Norwegian border is mountainous and occupied by the Kiolen mountain range. The highest peaks are in the north, where the Kebnekaise rises to an elevation of 7005 ft. In conjunction with this range is a bleak plateau, while south of the depression occupied by the southern lakes is a hilly district that rises from the plateau several hundred feet above the plains along the coast. The remainder of Sweden is a plateau that slopes from the mountain range down to a plain and to the fertile lowlands of Gotland. There are several large rivers, flowing without exception toward the southeast. The largest is the Klar Elf, emptying into Lake Vener; others include Göta Elf, Dal Elf and Luleå. The lakes are numerous and distinguished for the clearness of their waters and for their picturesque surroundings. Lake Vener, the largest, is third in size among European lakes and contains 2000 sq. m. Others are lakes Vetter, Mälar and Hjelmar.

CLIMATE. The climate of Sweden is generally continental and not oceanic, as is that of Norway, but it is not wholly unaffected by the oceanic drift. On the whole, it is very healthful, and during the winter the country is completely covered with snow, affording excellent advantages for the popular sport of traveling on skis, or long wooden runners for the feet (See SKIING). The rainfall is not extensive, and averages about 20 inches. The Northern summers are short, but enjoy a duration of sunshine and light. As far south as Hernösand, the daylight continues uninterruptedly from the 16th to the 27th of June.

MINERAL RESOURCES AND FISHERIES. The mineral industry, though superior to that of Norway, is relatively unimportant. Coal is scarce, and for manufacturing purposes the country depends on charcoal or import coal from the Continent. Iron is abundant, and the Swedish product, free from phosphorus, is considered unsurpassed in the world. Magnetite and manganese ores, copper, zinc ore, lead and silver are also found. Over 30,000 people are employed in the mining industry. The fisheries are inferior to those of Norway, and do not

supply the home demand; herring and salmon represent the chief catch.

Agriculture and Forestry. Agriculture and cattle breeding employ more than one-half of the total population, although only 12 per cent of the whole land area is favorable for cultivation. The most fertile territory is in the southern part. The wheat and rye supply does not suffice for home use, despite the fact that numerous modern improvements in farming methods have been effected within recent years. Oats represent the chief grain and export crop. Other products are flax, sugar beets, tobacco, hops, barley and potatoes. Large supplies of hay and other forage crops are raised, and where stock raising is a significant occupation, dairying methods have been improved and large quantities of butter are exported to Great Britain. Half the total area is under forest, and about one-third of the forest area is public, belonging to parishes or to the Crown. The forests yield approximately 2,500,000 cubic meters of timber annually, and give rise to a timber industry that ranks among the most important of the manufactures of the country.

Manufactures, Commerce and Transportation. The government has done much to assist the manufacturing industries of the country, but lack of coal, capital and population has retarded their successful development. The saw and planing mills produce extensive lumber supplies, and the various branches of the timber industry, including wood pulp, make it the leading manufacturing industry. Swedish matches are famous and are produced principally at Jönköping. Linen, woolen and cotton goods are manufactured in fairly large quantities. The products obtained from Swedish iron ore are of great value and durability, and include armor plates, cables, steel goods, bar iron, knives and nails. The largest iron works are near Eskilstuna, the chief machine shops at Motala; earthenware, cement and pottery works represent other important industries. The center of the beet sugar industry is in Skåne. The exports are principally iron and zinc, forest and dairy products and oats. Textiles, wool, machinery and food products are imported. The trade is carried on chiefly with the countries which border on the Baltic and North seas. The ships are also used as carriers for a large part of the trade of other nations. The transportation facilities are admirable, and as the trade is chiefly maritime, the merchant marine is carefully maintained. The system of waterways is excellent, and canals connect the rivers, lakes and high seas. These canals provide 2500 m. of inland navigation. The railroads are cheaply constructed because of the large supplies of lumber and iron, and a total mileage of nearly 8000 m. is maintained, of which the state owns about one-third. A continuous line of 1200 m. extends from Gellivare in the north to Malmö in the south.

Inhabitants. The Swedish people belong to the Scandinavian branch of the Teutonic race. In the northern part of the country are about 20,000 Finns and 7000 Lapps. The Swedish type is represented by a tall and slender form, fair complexion, light hair and blue eyes, by a temperament noticeably light-hearted and vivacious, and qualities of courtesy and firmness that have won for them a reputation for honesty and general intelligence. The Swedish language differs in part from the other Scandinavian tongues, and in the provinces it is broken up into widely different dialects.

Literature. See Literature, subhead *Scandinavian Literature.*

Government. The government is a limited monarchy by the fundamental laws of the country, which have never been embodied in one single written constitution, but in various enactments of the Diet from 1809 to 1866. Between 1814 and 1905 Sweden and Norway were united under a common king (for the political separation see this article, subhead *History,* and Norway, subhead *History*). The king is required to be a member of the Lutheran Church and is chosen by the Diet in case of failure of succession. The law of succession ex-

cludes women from the throne. Executive power is vested in the king alone; he shares the legislative powers with the Riksdag (Diet). His cabinet consists of 11 councilors, who must be of Swedish birth and members of the Lutheran Church. The Diet consists of two houses —the upper chamber consisting of 150 members, elected for nine years, and the lower chamber comprising 230 members, serving for three years. In 1907 universal manhood suffrage was adopted, and in 1912 the right of voting was extended to women. Local government is administered through the 25 *läns,* or provinces, into which the country is divided. A prefect nominated by the king supervises each province, and internal affairs are regulated by a general council, or Landsting.

Religion and Education. The State Church is the Lutheran Church, and the majority of the population represents that faith. The State Church consists of 13 bishoprics and 2576 parishes. There are a comparatively small number of Roman Catholics, as well as a few representatives of Protestant faiths other than the Lutheran. Education is compulsory, and almost all the inhabitants of school age or more are able to read and write. The universities and secondary schools are modeled upon the German system; the national treasury supplies about one-fourth of the funds used for elementary education.

History. The early history of Sweden is hopelessly entangled with legends of the daring and adventures of heroes. The authentic history began about 1000 A. D., when Christianity was established by Olaf. Then followed three centuries of strife between the Swedes in the north and the Goths in the south. In the 11th century Finland was acquired during a period of missionary zeal. The country was joined with Denmark and Norway in 1397 by the Union of Kalmar under Margaret of Denmark. Popular dissatisfaction led to a successful revolt under Gustavus Vasa, who was made king in 1523. From this time Sweden was free from Danish domination.

Gustavus Adolphus first brought Sweden within the circle of European politics. Urged on by the double spur of religious zeal and personal ambition, he threw himself with ardor into the Thirty Years' War, where he met with an untimely death (See Thirty Years' War; Gustavus Adolphus). For a while after his death, Sweden was still of some importance in European politics, and a little territory was added; but in 1675 the Elector of Brandenburg, Frederick William, utterly defeated the Swedes.

Charles XII (1697-1718) astounded Europe by his precocious military genius and his early successes against Denmark and Russia, but he met his defeat at Poltava in 1709. He left his country in an enfeebled state, and the warring factions were not subdued until the reign of Gustavus III (1771-1792). He was assassinated and succeeded by Gustavus IV, who was finally deposed in 1809. Charles XIII, his uncle, was elected king. He had no heirs, and the government tried to conciliate Napoleon by choosing Bernadotte crown prince (See Bernadotte, Jean). He succeeded as Charles XIV and joined the allies in the overthrow of Napoleon. The allies rewarded the Swedes at the Congress of Vienna by taking Norway from Denmark and passing it over to Sweden. Bernadotte maintained a foreign peace policy and built up the resources of the country, though he opposed the reforms of the people.

Under Oscar I (1844-1859), Charles XV (1859-1872) and Oscar II (1872-1907) the prosperity of the country continued, and an advance was made in democracy. During the long reign of Oscar II the right of suffrage was extended and the merchant marine increased, while canals and railways led to a greater development of industry. In 1905 came the separation of Norway from Sweden, and in 1907 Oscar's eldest son succeeded him as Gustavus V. Population 5,757,566.

Swe'denborg, Emanuel (1688-1772), a Swedish theologian and scientist, the founder of the New Jerusalem Church, or sect of Swedenborgians. He was born

in Stockholm and was the son of Jesper Svedberg, later Bishop of Skara. After studying at Upsala and traveling in England and on the Continent, he was appointed assessor of mines by Charles XII and in 1719 he was ennobled. During the time he was engaged in the duties of assessorship he became interested in various problems connected with physics, astronomy, mathematics and chemistry, and gradually turned to the construction of an independent theory of the origin of the universe, and the works which he published at this time reveal this interest. After 1745 his career became more and more that of the seer, rather than the scientist, and he claimed for himself a conscious existence in the spiritual world as fully as if he had died and become an inhabitant of that world. His writings reveal the visions of heaven and hell, the world of spirits, the last general judgment, which he professed it was his privilege to have witnessed from time to time. He wrote in Latin, and during his lifetime the works attracted but slight attention, and any definite attempt toward an organization of his followers did not occur until 1782. For an account of the movement, which soon became widespread, and the religious belief of Swedenborg, see SWEDENBORGIANS. The collected works of Swedenborg include *Arcana Cœlestia, New Jerusalem, Angelic Wisdom, Apocalypse Explained* and *Heaven and Hell.*

Swedenborgians, *Swe" den bor' ji ans,* the name applied generally to the followers of Emanuel Swedenborg, a Swedish theologian of the 18th century. Many believers in his teachings have not severed connections with their original churches, but the majority have organized what they call the Church of the New Jerusalem. The Swedenborgian movement in Great Britain began in 1782. Six years later public services were first held and in 1789 the General Conference of the New Jerusalem Church began its sessions. Societies of Swedenborgians have been established in Paris, Zürich, Florence, Budapest, Vienna, Stuttgart, Copenhagen, Stockholm and Göteborg. In the United States the first society was organized in 1792, the first General Convention being held in 1817. The General Convention is composed of 12 state organizations, called associations, and of nine separate societies.

Swedenborg taught that Jesus Christ is God, in whom there is a Trinity, not of persons, but of divine essentials, corresponding to the soul, the body and the operation of these in man; that the key to the spiritual meaning contained in the Scriptures is the correspondence between natural and spiritual things, as between effects and their causes; that salvation comes from shunning evil and living according to the Ten Commandments; that man is a spirit clothed with a natural body for life on earth; that when the natural body is put off at death man continues to live as before, but in the spiritual world, first in an intermediate state between heaven and hell, afterwards either in heaven or hell, according as his character is good or evil; that the Last Judgment in the world of spirits was effected in 1757, at which time a new dispensation and a new Church began.

There is a smaller body of Swedenborgians called the General Church of the New Jerusalem. The larger body reported for the United States, in 1911, 8500 communicants; the smaller, 814.

Sweet'bri"er, Wild Rose, or **Eg'lantine,** a beautiful little shrub of the Rose Family, having slender, arching stems and fragrant foliage. It grows along woodland roads, in rocky fields or in meadow wastes and is a delightful little plant in spite of its thorny stems. These stems, which may grow to a length of six feet, are shiny brown in color and the thorns are sharply curved back. The leaves are made up of five or seven bright green, rounding, saw-edged leaflets, and these with the flowers seem to be arranged in clusters at regular distances along the stems. The flowers are small pink roses, having the regular, five-parted, cup-shaped calyx and five spreading, blunt-topped petals, surrounding

many yellow stamens. The fruit is a dry, red berry, bearing upon its summit the remnants of the calyx.

Sweetbrier grows from Nova Scotia west to the Dakotas and south as far as Tennessee, but is not native in the United States, having been brought here from Europe.

Sweet Flag, a reedlike water plant of the Arum Family, having a thick, creeping rootstock, which is woody and fragrant. The leaves are flat and like two-edged swords in shape; they grow directly from the rootstock and ordinarily attain a height of about two feet. The flowers grow upon a thickened stalk, called a spathe, which extends at an angle from a long projection much like the leaves in form. The greenish flowers are crowded closely upon this spathe and are consequently rather inconspicuous as individuals. Each separate flower, however, has its spreading petals and curving stamens growing about a thickened, three-celled pistil, within which the seeds are borne. The root of the sweet flag is used in medicine as a stimulant and is otherwise used as a flavor for snuff, beer and vinegar.

Sweet Pea, a favorite garden herb of the Pulse, or Pea, Family, cultivated from Europe for its charming, fragrant flowers. It is an annual plant which is found in many varieties; some are erect, short-stemmed plants, and others are long-stemmed climbers that need support. The leaves are pale green in color and thin in texture, and are borne in pairs upon slender stems. The flowers are butterfly-shaped, and are produced in a variety of shades. They bloom in June and July.

Sweet Potato, a plant or the thickened, fleshy root of the same plant, belonging to the Convolvulus Family. It is an American creeping plant having much-divided leaves and spreading, tubular blossoms. The roots are rich and nutritious and are widely cultivated in the West and South, where they grow well. The roots are long, tapering at both ends, and are of reddish-yellow color within. As the name implies, they are sweet to the taste, and they are in wide demand during the fall and winter, when they may be seen in the markets. Sweet potatoes are naturally tropical but have been cultivated in fairly temperate regions. In the United States, Georgia, Florida and Louisiana lead in their production.

Sweet William, a species of the Pink Family, common in flower gardens or escaped to roadsides. The leaves are thin and narrow, almost stemless. The flowers grow in a flat-topped cluster and have sharp-toothed petals which are variously colored. They have a slight fragrance and bloom all through the summer.

Swift, a bird of the Swift Family. The chimney swift, or chimney swallow, is somewhat smaller than the English sparrow. Its sooty-brown color, long and very narrow wings, and the sharp spines or elastic quills on the ends of the tail feathers distinguish it from all other birds. Though called a swallow, it is not related to that family, resembling the swallow only in its mode of life. Before the advent of chimneys these birds built their nests in hollow trees, but they have pretty generally abandoned this original nesting site in favor of the chimneys on houses. Inside this secure retreat the semicircular nest of short sticks is cemented together and attached to the chimney by means of a glutinous substance produced by the salivary glands. From four to six white eggs are laid. The swift never perches as swallows do, but rests by clinging to the bricks inside of the chimney, supported by its spiny tail.

Swift, Jonathan (1667-1745), an English satirist, born in Dublin. He studied at Trinity College, Dublin, but did not distinguish himself in his school work, preferring a promiscuous reading of history and poetry to the prescribed course of study. During the Revolution of 1688 he went to England and became secretary to Sir William Temple in Surrey. In 1694, after quarreling with Temple, he returned to Ireland, sought ordination, but tired, after two years, of

his small living at Kilroot, near Belfast, and returned to Temple at Moor Park. Here he had previously met the young girl whom he later immortalized as "Stella" in his writings, and he now assisted in her education. He described her as of great beauty, with hair blacker than the raven, and with a face every feature of which was perfect. In this place of comparative solitude he found time for wide reading and opportunity for writing; the end of the period of seclusion found little accomplished except a few Pindaric odes, which gave no great promise for the future.

His first contribution of importance was his *The Battle of the Books,* a burlesque dealing with the relative merits of ancient and modern literature. Then he returned to Ireland and was for a short time secretary and chaplain to Lord Berkeley, and was soon afterwards appointed to the rectory of Agher. In 1704 he published the *Tale of a Tub,* which has the distinction of possessing matchless irony and striking originality, and ranks among his best works. Six years later he assumed the editorship of the *Examiner* and in it he made brilliant attacks on the Whigs, all the while defending the policy of the Tories. The same year he began his *Journal to Stella,* and within the five years that followed were witnessed the deaths of both Stella and Vanessa, the two girls whose lives were so completely and unhappily colored by the love he had professed for both of them. Later literary triumphs in Swift's career were associated with the publication of the *Drapier Letters* and *Gulliver's Travels,* the last an unrivaled satire on mankind. Approaching disease made death welcome to him at last, and with his passing, men marked the loss of one of the strangest men in the history of English literature—a man inspiring alike both pity and awe, a heartless egoist and yet one of the sincerest of men and friends.

Swim'ming, the act by which animals and men make their way unaided along or beneath the surface of a body of water, especially of depth greater than their own height. For most animals, except monkeys, swimming is almost instinctive, because it is accomplished by natural movements nearly identical with those by which they walk; while under proper instruction, almost any person may soon master the art. Because swimming is at once a healthful and pleasurable sport, and because its mastery not infrequently makes possible the saving of human lives, it has become a compulsory exercise in many schools and is everywhere encouraged. The greatest obstacle to be overcome by beginners is lack of confidence; for, in fact, fresh water, and to an even greater degree ocean water, will buoy up the body.

In large lakes and in the ocean, or wherever the water can safely be considered free from pollution, the beginner could perhaps make no better start than by accustoming himself to kneel in smooth, shallow water and submerge his head with eyes wide open, while temporarily holding his breath. Having learned to do this, for perhaps two or three minutes at a time, and having accustomed himself to the presence of water in the eyes, nose and ears, he should gradually move into water not quite so shallow, stretch out full length and practice kicking with both feet alternately, while walking along on his hands, the body being almost wholly submerged. This will suggest the proper movement of the hands and arms for swimming *dog fashion,* for the arms should first be used just as the dog uses his front feet, not only because they will thus force the body forward, but because, more naturally than any other stroke, these movements tend to keep the head above the surface and thus inspire confidence. Where slight support may be had from a suspended belt, all the proper strokes for both arms and feet can soon be mastered.

Swin'burne, Algernon Charles (1837-1909), an English poet and critic, born in London. He studied at Oxford, but left in 1860 without taking a degree, traveled on the Continent and lived in Italy for a short while. As one of the

Pre-Raphaelites he attracted attention with the singular beauty, the color, the rich melody, the sweeping measures of his unrestrained verse. There is such a resplendence about his song, and such fertility of imagination, as well as facility of expression, that he forced the world to listen to his ballads, dramas and lyrics alike. As a critic he is brilliant rather than sound, hating as enthusiastically as he loves; he is stimulating, however, for he deemed appreciation the highest function of criticism. His lyrics of the sea, of freedom and of childhood are full of magic and ecstasy. He aroused enmity none the less because of the anti-Christian views, which he found such joy in advancing, and his republicanism that at times became violent. Among his works are *The Queen Mother, Rosamond, Atalanta in Calydon, Songs of Italy, Songs Before Sunrise, Poems and Ballads, Bothwell, Study of Shakespeare, Mary Stuart, A Century of Roundels, Songs of the Springtides, The Tale of Balen, Studies in Prose and Poetry, The Age of Shakespeare* and *Tristram of Lyonesse.*

Swiss Guards, mercenary troops who have formed the body guard of the pope for about 200 years. In France the Swiss Guards began as a regiment in 1616. Their devotion to the King made them disliked by the people during the Revolution, and in August, 1792, they were massacred while defending the Tuileries against the Paris mob.

Swit'zerland, a country of central Europe, comprising the Swiss Confederation. It lies between 45° 50′ and 47° 45′ north latitude and 6° and 10° 25′ east longitude, and is bounded on the n. by Germany and Lake Constance, on the e. by Austria-Hungary and Liechtenstein, on the s. by Italy and the Lake of Geneva and on the w. by France. Its extent from north to south is 120 m., and from east to west over 200 m.; the total area is 15,975 sq. m., a little less than one-half the area of the State of Maine.

Surface, Rivers and Lakes. No other country in Europe has such an extent of mountainous surface as Switzerland, over three-fourths of its area being covered with mountains. The Swiss Alps are in the central and southern parts, and the Juras in the northwest. Between these ranges lies the great Swiss plateau, where the greater part of the population dwells. Picturesque hills stud its surface, and the valleys stretching between the ranges possess great beauty and variety of scenery. Mount St. Gotthard forms the nucleus of the great Alpine system, from which radiate the ranges to all sides. The different Alpine divisions are the Swiss, Helvetian, or Lepontine, Pennine and Rhætian Alps. The highest summits in Switzerland are Monte Rosa, the culmination of the Pennine Alps, the Matterhorn, Weisshorn and Mischabelhörner (also in the same group), the Bernina in the Swiss Alps, the Finsteraarhorn, Jungfrau, Mönch and Schreckhorn in the Bernese Alps. See Alps.

The rivers of Switzerland are large and form picturesque features of the valleys lying between the huge mountain masses. The headwaters of the Rhine, the Rhône and the Po are found here, the Rhine with its tributaries forming the chief river system and draining a large part of the country into the North Sea. Others are the Rhône, Aar, Ticino and the Inn. All the rivers are larger in summer than in winter, due to the fact that they are constantly fed by the melting glaciers; they are not navigable because of the rapidity of their flow, but this, on the other hand, fits them for industrial purposes. Because of that fact the snow is sometimes called the "white coal of Switzerland." The lakes are large and numerous and of marvelous grandeur and beauty. Among the 15 important lakes are Geneva, Constance, Neuchâtel, Lucerne, Lugano, Maggiore, Zürich and Thun.

Climate. The climates of the country are numerous and vary from the regions of oaks, pines, firs, beeches, vines and olives to those of the pastures of the highlands, rhododendrons and perpetual snow. Generally the average climate is healthful and bracing, but not conducive

to extensive agriculture. On the central plains the mean average of temperature is 50°, and this diminishes at the rate of 3° per every 1000 ft., with the result that the higher valleys suffer from extremes of cold. The snow line on the northern side of the Alps is about 8530 ft. above sea level; the southern side enjoys almost a tropical climate, and the line rises to 10,170 ft. A warm south wind, known as the Föhn, causes the snows to melt rapidly, and destructive avalanches and inundations often result.

Mining and Agriculture. The mining industry of Switzerland is not important. Among the deposits are anthracite, asphalt, slate, marble and rock crystals, but the mineral products of the country do not suffice for home demand. Building stone (sand and limestone) and rock salt are found in the greatest quantities. Agriculture and cattle raising represent the important industries, and hay and pasture lands cover more territory than the cultivated areas. The principal products are wheat, rye, oats, potatoes and grapes. As a result of the fruit culture, large amounts of wine and spirits are manufactured. The country is famous for its manufacture of cheese and condensed milk. In the higher regions cattle breeding is almost the only resource of the inhabitants, and a large number of cattle are exported for the same purpose, while, on the other hand, about 50,000 beef cattle must be imported annually to supply the deficiency in beef during the summer, caused principally by the large influx of tourists. Fish are abundant in the lakes.

Manufactures, Commerce and Transportation. Switzerland is an important manufacturing country, and its extensive water power, neighboring markets and the thrift and industry of the inhabitants offset the disadvantages arising from lack of navigable rivers, seaports, iron and coal. The cotton and textile industries are the most significant, while the embroidery industry and the machine-made lace are famed. Watchmaking was long very prosperous, and within recent years machinery has been introduced and a large number of cheaper watches are put out, in order that the country may hold its own with the competitive industry of the United States. The manufacture of machinery and jewelry, and wood carving, leather making and tanning are important industries. The chief aim is to produce articles distinguished for their excellence; hence the annual export trade is not extensive. It consists, in the main, of wine, watches, fine steel and iron goods, silk and cotton goods and cheese.

The imports are foodstuffs, including grain; and cattle, iron, coal, cotton and petroleum. Railroads carry the traffic, and gradually the state is acquiring entire control of the comparatively extensive mileage. Navigation on the lakes is important, while that on the rivers is not. Excellent wagon roads are maintained.

Inhabitants. The Helvetii, of supposed Celtic origin, and the Rhætii, of common stock with the Etruscans, are the two early races inhabiting the country. The Celtic element now by far prevails, and the sharp distinctions between the northern and southern, or Teutonic and Romanic, elements are no longer important. The language is principally German, but French is spoken to some extent in the west and both French and Italian in the south. The Swiss possess the admirable qualities of frugality and honesty, which make for a hardy, thrifty race.

Government. Switzerland is a federal republic, consisting of 22 cantons, with Bern as the capital of the state. Three of the cantons are politically divided. The constitution vests the executive power in a Federal Council, composed of seven members. They are elected by the two houses of the Federal Legislature and serve for a term of three years. Only one member is chosen from the same canton, and it is customary to select them from among the members of the Federal Legislature. This Federal Assembly consists of the National Council and Council of Estates, and exercises the legislative power. The National Council consists of members

chosen by direct universal suffrage and serving for a term of three years. There is one representative for every 20,000 inhabitants. The Council of Estates is made up of 44 members, that is, two from each canton. The Federal Assembly meets twice annually, in June and in December, and the readings take place in German and in French, while the discussions are in German, French or Italian. Local government is controlled through the cantons, districts and communes into which the country is divided, and each canton has a constitution and local government of its own. The initiative and referendum are important features of local legislation.

Education and Religion. Education is compulsory, but the law is enforced more strictly in some cantons than in others. The school attendance exceeds 600,000. The largest institutions of the country are the universities of Bern, Geneva, Zürich and Fribourg, the "Federal Polytechnic" at Zürich and the academies of Geneva and Lausanne. Protestantism is the religion of about three-fifths of the inhabitants; the remainder represent the Roman Catholic faith. There is, throughout the country, complete liberty of conscience.

Chief Cities. Bern is the capital of Switzerland. Other large cities are Zürich, Basel, Geneva and Lucerne.

History. The Helvetii, the oldest inhabitants of Switzerland, were conquered between 58 B. C. and 10 A. D. by the Romans (See Helvetii). Various Germanic tribes invaded the country as Roman power declined, and by 534 it had become a part of the Frankish Empire. After Charlemagne it was divided between France and the German Empire, but the whole country fell to the empire later. A union of the three forest cantons, Uri, Unterwalden and Schwyz, was formed against the Austrian rulers as early as the 13th century, and in 1315 they defeated the Austrian forces at Morgarten. Lucerne, Zürich and Bern soon joined them. In 1386 the Austrians suffered another defeat at the Battle of Sempach, and still again in 1388 at the Battle of Näfels. By 1460 the Austrians had been driven from the country, and the Swiss routed the army of Charles the Bold at Granson and Morat in 1476 and helped in his last defeat at Nancy the next year.

The Swiss had their last war with Austria in 1499 and came out victors in six hardly contested battles. From this time they were virtually free, but Austria would not recognize their independence until the Peace of Westphalia in 1648. By various additions there were now many districts in which Italian and French were spoken, and this kept the people from uniting into a compact state.

Zwingli led the Protestant revolt in 1519, and the new faith spread rapidly in the country. War broke out between the Catholics and Protestants in 1531, and the Protestants were defeated at Kappel and Zwingli was killed. The work of the Reformation continued under Calvin at Geneva, and then followed centuries of religious and political strife. The Protestants were finally successful at the Battle of Villemergen in 1712, and from this time the country began an advance in material development and in law and literature.

The French took Switzerland in 1798 and organized it as the Helvetic Republic. This lasted four years but proved unsuccessful. In 1803 Napoleon gave each canton a separate constitution with a central legislative body, called the Diet, to compel obedience. Six new cantons were added by placing subject districts on the same rank as the old cantons.

By the Congress of Vienna in 1814 the cantons were placed under a looser union, and three more cantons were added, thus making 22, the present number. In 1815 the great powers of Europe guaranteed to maintain the neutrality of Switzerland. In 1848 a new constitution was formed. Since then the Swiss have been one nation, and the country now ranks as one of the most progressive in the world. The honesty of the public officials of Switzerland evokes the admiration of the world. In 1891 the 600th anniversary of the old Swiss

League was celebrated. Population estimated 4,000,000.

Sword, *Sord,* a weapon consisting of a long blade and a handle. The blade may be pointed or blunt, and have one or both edges sharpened. The sword is for hand to hand encounter, and as a military weapon now has but little use. It is, however, a badge of authority, and in both army and navy constitutes a part of a commissioned officer's equipment. From ancient times the sword has been a personal weapon. During the Middle Ages and until comparatively recent times skill in its use was considered a necessary accomplishment for knights, gentlemen and officers of the army and navy. Giving up the sword is the official act of surrender in war. Kissing the sword, in the Far East, is considered the most solemn pledge that can be made.

There have been many different patterns of swords in all ages. The modern military sword of all civilized nations is constructed to combine all advantages of cutting and thrusting. It combines lightness and strength. The French long sword has a blade 35 inches long; that of the German cavalry is 32½ inches; that of the British cavalry officer, 35 inches. In the United States army the saber has replaced the sword. There are three sizes, varying in length from 30 to 34 inches. See FENCING; RAPIER.

Sword'fish", a family of fishes whose members are widely distributed in the warmer oceans. The name has been given because of the long, rapierlike snout with which the fish defends itself and procures its prey. The whole form of the fish assists in the velocity of its attack; the body is slender and tapering; the dorsal fin is erect, and as the fish swims near to the surface this fin and the upper fork protrude from the water. There are no ventral fins. Swordfish follow schools of mackerel and swim slowly until ready to make an attack; then seized with some unaccountable frenzy they lash the water, striking their prey with so great force as to cut large fish in two at a single blow, and in their excitement even attacking boats or other objects far larger than themselves. Swordfish are found upon both sides of the Atlantic and, rarely, upon Californian and Japanese coasts; the flesh, though coarse, is well flavored. The average length of the swordfish is something less than five feet, although several over seven feet long have been taken. The largest recorded specimen weighed nearly 600 pounds.

Sycamore, *Sik' a more,* a large and interesting tree of the Breadfruit Family, closely related to the fig. The tree has a thick trunk, branching not far from the ground, large triangular leaves and clusters of fleshy receptacles, within which the flowers and fruit are borne, much as the blossoms and fruit of the fig; they are in fact called figs and are edible, though not as pleasant to the taste as are true figs. The wood of the sycamore is durable and mummy cases made from it have remained sound through centuries of entombment. The sycamore grows in Mediterranean regions, chiefly Egypt and Palestine, and is mentioned often in the Bible as being an abundant forest or wayside tree. In America the plane tree, or buttonwood, is called the sycamore. See PLANE TREE.

Syd'ney, the oldest city of Australia and the capital of New South Wales. It it situated among surroundings of great natural beauty and upon a magnificent landlocked harbor, which renders it one of the great commercial cities of the British Southern possessions. The city was founded in 1788 as a penal colony, but its numerous advantages made it speedily recognized as an excellent location for trade. The modern city resembles the European capitals in attractiveness, and it has many public and private buildings of interest and importance. Among these are the University of Sydney, the Australian Museum, the National Art Gallery, Macleay Museum of Natural History, the Cathedral of St. Andrew, the Houses of Parliament, the mint and the city library. In the center of the city is Hyde Park, which con-

nects with the extensive botanical gardens and from which Macquarie Street, a famous avenue, leads to the bay. The chief exports are wool, leather and gold. The industries include the manufacture of locomotives, machinery, boots, shoes, tobacco, clothing, liquors and fabrics. The population, including that of the suburbs, is 763,300.

Sydney, a city of Canada in the Province of Nova Scotia, on the southwest arm of Sydney Harbor and on the Intercolonial and the Canadian Pacific railways, 285 m. n.e. of Halifax. The harbor is one of the best on the Atlantic coast, but it is icebound about two months out of each year. There is steamship connection with Montreal, Quebec and numerous other cities. Sydney is an important seaport town, exporting coal, iron, steel and general merchandise. Among the important buildings are the county courthouse, a post office and banks. The leading industrial establishments include aerated-water and pork-packing plants, a planing mill, boat and motor-boat factories, manufactories of cement machinery and ironworks. The Dominion Steel Works, covering 600 acres and employing 3000 hands, and the Cape Breton Coal Mining Company are located here. From 1784 to 1820 Sydney was the capital of the separate Province of Cape Breton. Population in 1911, 17,723.

Syenite, *Si' e nite,* a rock resembling granite in structure and composed essentially of feldspar, mica and hornblende or augite. It derives its name from Syene (now Assuan), Egypt, where it was used for obelisks. Syenite is quarried in Scotland, Saxony, Sweden and Norway and in several places in the United States. In the last-named country a beautiful iridescent variety, much in demand for ornamental purposes, occurs in great abundance. Commercially syenite is generally considered a variety of granite. See GRANITE.

Syllogism, *Sil' o jiz'm,* a term used in logic to designate an argument so stated in three propositions that its validity is necessarily established. The first two propositions are called *premises.* The third is the *conclusion,* and results from the other two. Each premise contains two terms, of which one (called the middle term) is common to both and unites the other two terms in the conclusion. The main proposition is called the major premise, and contains the predicate of the conclusion. The second proposition is called the minor premise, and contains the subject of the conclusion. The simple form of the deductive syllogism is as follows:

A is B (Major premise)
C is A (Minor premise)
Therefore, C is B (Conclusion)

Or, expressed in words:

All quadrupeds are animals.
The horse is a quadruped.
Therefore, The horse is an animal.

The conclusion is valid because it logically follows from the premises. A syllogism may be stated either in positive or in negative form and may include either all or part of a subject.

Sylves'ter II, pope from 999 to 1003, born in Auvergne. In 998 he was appointed Archbishop of Ravenna and became pope the next year. He was a patron of learning and the author of several works in mathematics. He was considered the most learned man of his time.

Sym"pathet'ic Nerves. See NERVOUS SYSTEM.

Synagogue, *Sin' a gog,* the name applied to the place where the Jews assembled for public worship. It is thought that the synagogue originated during the Babylonian Captivity. The synagogues were characterized by elaborate ornamentation, both without and within. All were so erected that the faces of the worshipers were directed toward Jerusalem; also there was always a slight descent at the entrance of the building, which stood so as to be visible from afar. Within, at the extreme eastern end, was the holy Ark, containing several copies of the Pentateuch, from which the periodical readings were chanted, and in front of this was the stand for the public reader of the prayers. The preacher

stood on a raised platform in the middle of the synagogue. The men and women sat in separate sections. A board of elders, at whose head was a chief elder, administered the affairs of the synagogue. The *chazzan,* in early times, was the officer in charge of the sacred place and its contents. He also announced the advent of days of worship from the synagogue roof by blowing a trumpet. Later the name *chazzan* was applied to the officiating minister. Other dignitaries were the almoners, or deacons, who were the collectors and distributors of alms. The third, sixth and ninth hours were appointed for daily worship. In early times a feature of synagogue worship was the exposition of the Law or the day's lesson, by some person of ability, but in course of time a more impressive liturgy developed. The synagogues exerted a vast influence on the development of Judaism as places of instruction, and in the Middle Ages had become centers of intellectual and social life, as well as religious centers.

Synchronograph, *Sin kron' o graf,* an apparatus employed for the rapid transmission of signals in machine telegraphy. It consists of a metallic disk, mounted on an axis, and a brush through which is supplied an alternating electric current, with a tap passing between the disk and the brush to open and close the circuit of the current. By its use 2000 to 4000 words per minute have been transmitted. See TELEGRAPH.

Syndicalism, *Sin' di cal iz'm,* a labor movement which has for its purpose placing with the workers of any great branch of industry the ownership of the materials and machinery by which the industry is carried on, and the control and administration of the industry. The term comes from the French word *syndicat,* meaning trade union. Syndicalism originated in France, but since 1910 its activities have been most apparent in England and the United States. It is due to the unrest of the wage earners because of what they regard as the unequal distribution of the products of labor. They regard any wage system as unjust. The syndicalist believes that capital and labor are and will continue to be constantly opposed to each other and that this strife will cease only when the capitalistic class is abolished. The method generally advocated for bringing about this result is the general strike, not a strike accompanied by violence but a universal cessation from labor by all workers engaged in a single industry or all industries. Such a strike would paralyze the industries affected and render the capital invested nonproductive. It could be made productive only by turning everything pertaining to the industry over to the workers. The wage system would be abolished, and each would secure the share of production to which he is entitled.

In the United States the Independent Workers of the World are the strongest advocates of syndicalism. While it is increasing in England and America the movement is on the wane in France. Consult *The Labor Movement in France, a Study in Revolutionary Syndicalism,* by Louis Levine.

Synge, John Millington (1871-1909), a British dramatist and poet, born at Rathfarnham, Dublin Co., Ireland. After taking his degree at Trinity College, he traveled on the Continent, devoting considerable time to study and writing. In 1899 William Butler Yeats found him in Paris, and at the former's suggestion Synge went back to Ireland to write for the Irish theater Yeats was then starting. In 1900-1901 he contributed some articles on Irish literature to the London *Speaker,* and thereafter divided his time between London and Ireland. He was actively associated with Yeats and Lady Gregory in their reviving of the native Irish drama, and wrote a number of plays which were performed by the Abbey Theater company (See IRISH PLAYS). His field was the life of the peasant of remote western Ireland, and his plays reveal a determined truthfulness in the portrayal of both the peasant language and character. He wrote fearlessly and with energy, always displaying a strong sense of nationalism. His

works include *Poems and Translations, In the Shadow of the Glen, Riders to the Sea, The Playboy of the Western World, The Tinker's Wedding* and *Deirdre of the Sorrows.*

Syr'acuse", N. Y., a city and county seat of Onondaga Co., 81 m. e. of Rochester and 148 m. w. of Albany, on the southern end of Onondaga Lake, on the Oswego and Erie canals and on the New York Central & Hudson River, the West Shore, the Delaware, Lackawanna & Western and other railroads. Radiating from Syracuse are electric lines in all directions, linking the city with Auburn and Rochester on the west, with Oswego and Fulton on the north, with Utica, Oneida and Fayetteville on the east and with Rockwell Springs on the south. Syracuse is beautifully situated. The city lies among the foothills, where the Valley of the Onondaga widens and is surrounded by scenery that has made the lake country of New York State famous.

Parks and Boulevards. The streets of the city present a parklike aspect with the trees and shrubbery. The park system comprises about 60 parks and squares, with a total area of over 350 acres. Burnet Park, containing 121 acres, is situated in the western, and Lincoln Park in the eastern part of the city. Schiller, Kirk, Onondaga and Frazer parks are also among the larger parks. The state agricultural fair, under the auspices of the New York State Fair Commission, is permanently located in Syracuse. Six miles south of Syracuse is the Onondaga Indian Reservation.

Public Buildings. Among the noteworthy buildings are a state armory, Federal Building, city hall, courthouse, a public library and Y. M. C. A. The city is also the see of a Catholic diocese. There are about 80 churches, many of them remarkably good specimens of church architecture. Most of the buildings of Syracuse University are exceptionally fine. The University Stadium, capable of holding 40,000 spectators, is built of concrete at a cost of $600,000.

Institutions. At the head of the educational institutions is Syracuse University (coeducational), founded in 1870. There are also the Teachers' Training School, three high schools, St. John's Academy (Catholic) and Travis Preparatory School. St. John's Military Academy (Episcopal) is located at Manlius, and 35 grade schools. Other institutions include the Good Shepherd, St. Joseph's, the Women and Children's, Homeopathic and St. Mary's hospitals, the Onondaga County, St. Vincent de Paul and House of Providence orphan asylums, shelter for unprotected girls, home for aged women and the Associated Charities. The State of New York maintains here an institution for feeble-minded children. The Onondaga Penitentiary is at Jamesville five miles southeast of the city.

Industries. Industrially Syracuse ranks fourth among the cities of the state. The city was long the principal seat of the salt industry in America. The Onondaga salt springs formerly belonging to the state are on the borders of Onondaga Lake. In 1908 the state sold the last of the salt lands, and instead of salt, soda ash is now largely manufactured, the village of Solvay, adjoining Syracuse, having the largest works for the production of soda ash in the world. The city is noted for the manufacture of typewriters. There are extensive manufactures, which include automobiles, carriages, shotguns, iron and steel tubing, toy cars, pressed brick, clay products, chemicals, electric appliances, gasoline and steam engines, hardware specialties, heating apparatus, tubular lamps, hydraulic presses, filing cabinets, brooms, caskets, furniture, boots, shoes and rubbers, soap, perfume, poultry foods, knit goods, wax candles, cigars, china, agricultural implements, furs, men's clothing, confectionery, canned-food products, soft drinks and structural iron and steel.

History. The Syracuse region became known through its salt deposits, which were mentioned as early as 1653. Ephraim Webster built a trading post here in 1786 and was the first white settler. The place was known as Webster's

Landing, which later was changed to Bogardus's Corners from the name of the proprietor of a local tavern. During the following years the name was changed several times, but the present name was adopted in 1824 with the establishment of a post office. The village was incorporated in 1825 and received a city charter in 1847. Population in 1920, U. S. Census, 171,717.

Syracuse University, at Syracuse, New York, has colleges in Liberal Arts, Fine Arts, Medicine, Law, Applied Science, Agriculture, Forestry and Pedagogy or teaching. There are also several schools: Graduate School, Oratory, Summer School, Homer Economics, Library and Night School. The Faculty numbers about 325; the normal registration is over 4000. The Library contains over 100,000 volumes, besides the libraries of Law and Medicine, etc.

Syr-Darya, *Sir Dahr' i ah,* a large river of southern Asiatic Russia. It rises on the western slopes of the Thian Shan Mountains and flows north and west into Lake Aral. The river is shallow and sluggish after leaving its mountain slopes, and in spite of its size is of little value for navigation. The name is sometimes written Sir-Daria.

Syr'ia, historically the region between the Mediterranean Sea on the w., the Euphrates River and the Syrian Desert on the e., the Alma Dagh on the n. and Egypt on the s. It is now a mandate of France and is officially divided into provinces of Jerusalem, Syria, Beirut, Lebanon, Aleppo and Zor, and with these boundaries it is also made to include Palestine. The total area is 114,530 sq. m. Among the loftiest mountain ranges is the Lebanon, reaching a highest elevation of 10,000 ft. A plateau extending from the Gulf of Akabah to the Dead Sea and from thence to the sea at Antioch divides Syria into two narrow stretches of land. The principal rivers are the Jordan, Jabbok and Yarmuk, and among the lakes are the Dead Sea and Gennesaret (now the Sea of Tiberias). The climate is severe and the rainfall is generally deficient. The mountainsides are still forest-clad, but only remnants of the famous and stately cedars of Lebanon survive. The modern agricultural industry is insignificant.

The population is Semitic, with predominating Mohammedans, and Arabic is the language most generally spoken. The principal towns are Jerusalem, Damascus, Beirut and Aleppo. The kings of Egypt subdued the greater part of Syria in 1500 B. C., but their advances to the north were largely checked by the attacks of the Hittites. The Israelites controlled the country during the time of David and Solomon, and when the Hebrew realm was broken up, Damascus for a time enjoyed independent government. The Babylonians, Persians, and Seleucidæ ruled successively, and in 64 B. C. Syria became a Roman province, while in 63 B. C. Judea became tributary to the Romans. During the Crusades the country came under Christian power, and in 1516 Syria was conquered by the Ottoman Turks. It has been the scene of numerous disastrous massacres from time to time. Population, 3,675,100.

Syrin'ga, or **Mock Orange,** a treelike shrub of the Saxifrage Family. Some species are natives of the United States and some of Japan. The leaves are light green and opposite each other on the stem. The square, cream-white flowers are fragrant and have four or, rarely, five petals. They open in June and July. The syringa is the state flower of Idaho.

The name syringa is the botanical name of the lilac, but is not commonly used.

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TABERNACLE, *Tab' er na k'l,* the tent or sanctuary in which the Israelites kept their sacred utensils during their wanderings in the wilderness. It was 45 ft. long, 15 ft. wide and 15 ft. high, rectangular in shape, with its smaller ends placed east and west, and having its entrance toward the east. The Tabernacle was placed inside a rectangular inclosure known as the court, 150 ft. by 75 ft., constructed of wooden pillars joined together by fixed hangings, with the entrance toward the east. The walls of the Tabernacle were made entirely of wood, the boards entering the ground by means of metal feet and being bound together by rods or bolts. This wooden frame, when curtains were thrown over it, assumed the appearance of a tent. Within there was a division two-thirds of the distance from the entrance, made by a curtain, the *vail.* The smaller portion, at the western end, formed the Holy of Holies. The larger portion was called the Holy Place, and within it was placed the altar of incense, just opposite the entrance to the Holy of Holies. On one side of the altar, toward the north wall, stood the table of shewbread; on the other side, the golden candlestick. Within the Holy of Holies was placed the sacred Ark of the Covenant. In the eastern half of the court, or inclosure, stood the altar of burnt offering; between the altar and the Tabernacle was the laver, where the priests washed their hands and feet before entering the sanctuary. The Tabernacle was dedicated on the first day of the second year after the Exodus, and during all the wanderings of the people a cloud rested on it by day and a pillar of fire by night. The Levites, who had charge of it, took it down and erected it at the places where they stopped. It was superseded by the Temple which Solomon built at Jerusalem.

Tabernacles, Feast of, the last of the three great Jewish festivals which required the presence of all the males in Jerusalem, the other two being the feasts of the Passover and the Pentecost. The time of this festival fell in autumn. It commemorated the dwelling of the Israelites in tents while they sojourned in the wilderness, but it was also a thanksgiving feast for the harvest and vintage. During the seven days allotted to the festival the people lived in booths erected in the courts of houses, on roofs and in the court of the Temple. A day of holy convocation followed the seven days of sacrifices and thanksgiving.

Ta'ble Mountain, a beautiful mountain of South Africa, 3582 ft. high, situated near the Cape of Good Hope and overlooking Cape Town. Its name refers to its flat top, which is frequently covered by fleecy clouds hanging like a cloth over its surface and down its sides. The slopes of the mountain have many gorges and ravines that are overgrown with luxuriant vegetation.

Ta'bor, Mount, a mountain in northern Palestine, on one of the northeastern levels of the Plain of Esdraelon, 6 m. e. of Nazareth and about 10 m. w. of the Sea of Galilee. It rises, a nearly isolated heap, 1843 ft. in altitude, forming an almost perfect cone. From the summit, which is like a platform, an extensive view of Palestine can be obtained. In the days of our Lord there was a Roman fort and garrison on the mountain, and a tradition of doubtful authority makes it the scene of the Transfiguration.

Tabriz, *Ta breez'*, a city of Persia, capital of the Province of Azerbaijan, situated in the valley of the Aji River, 30 m. e. of Lake Urumiah. It is a healthful city, but has few buildings of note. The famous "Blue Mosque," the great shanb (dome) and the sepulcher of the Mongol ruler, Ghazan Khan, are in ruins as the result of the ravages of time and repeated earthquakes. The citadel to the southwest, now used as an arsenal, is imposing with its burnt brick walls and the tower 120 ft. high. Tabriz is no longer of great commercial importance, for the trade of Persia is now carried on along the Bagdad road, on the railroad through the Caucasus and on the Caspian Sea. The principal exports are shawls, rugs and grapes. Population, estimated at 200,000.

Tacitus, *Tas' i tus,* **Publius Cornelius** (about 55-about 117), a Roman historian, one of the greatest of all time. Little is known of his early life, but he held various civil and military offices while still young, serving under Vespasian, being quæstor or ædile under Titus, prætor under Domitian and consul under Nerva. When about 23, he married the daughter of Agricola, whose life he subsequently wrote. Returning to Rome after years of provincial duties, he was intimate with the younger Pliny, practiced law and achieved distinction as an orator. The works of Tacitus still extant are *The Life of Agricola,* a masterpiece of its kind; several books and a fragment of another, of the *History,* extending from 69 A. D. to 97 A. D.; *The Annals,* of which, books 7 to 10, inclusive, out of the 16 are lost, and which cover a period of Roman history from 14 A. D. to 68 A. D.; *On the Origin and the Customs of the Germans* and a *Dialogue on Oratory.* In style Tacitus is perhaps overconcise; but he knew men and could portray them. It has been said that "Tacitus has this great advantage over Livy, that he helped to make history as well as to relate it."

Tacoma, *Ta ko' ma,* **Wash.,** a city, port of entry and county seat of Pierce Co., 32 m. n. of Olympia, the capital of Washington, at the mouth of the Puyallup River on Commencement Bay, an inlet of Puget Sound, 80 m. from the Pacific coast, and on the Northern Pacific, the Great Northern, the Chicago, Milwaukee & Puget Sound and the Oregon-Washington Railroad & Navigation Company (Union Pacific). Tacoma is the starting point of coastwise steamship lines for Alaska, Victoria, B. C., San Francisco, New York and other ports, and trans-Pacific lines to China, Japan, the Philippines and Australia, and to London, Liverpool, Hamburg and Glasgow via the Suez Canal. The landlocked harbor contains 9 sq. m. and is supplemented by 5 sq. m. of anchorage on adjoining waters. The city is located upon a peninsula, Point Defiance being at the end of the promontory. There is a third-rail interurban railway to Seattle and a modern trolley system throughout the city and suburbs. Tacoma is the largest subport in the Puget Sounds Customs District, made up of 28 subports, Seattle being the district headquarters. The city is one of the principal manufacturing points on the Pacific coast and has a large jobbing trade. Abundant water power, totaling 850,000-horsepower within a radius of 60 m., is used for generating electricity for industrial and municipal use. Two hundred-fifty thousand of the hydroelectric horsepower of the total available is already being developed in four modern plants and transmitted to Tacoma and other Puget Sound points under high tension.

PARKS AND BOULEVARDS. Tacoma is situated on a high bluff rising sheer from Commencement Bay, and the streets are laid out on a series of terraces. Pacific Avenue is the main business street of the city. Included in the park system of 1114 acres is Point Defiance Park, 640 acres, a military reservation surrounded on three

sides by Puget Sound. The city contains eight other attractive parks and squares. The streets are from 60 to 100 ft. wide, well paved and shaded, and there are many beautiful residences. On Jan. 1, 1919, there were 300 m. of paved streets, chiefly asphalt. Mt. Tacoma (Rainier) 14,343 ft. in height, lies to the southeast. The pure water supply is derived from the Green river, 46 m. from the city.

PUBLIC BUILDINGS. Among the noteworthy buildings are the Stadium High School, Lincoln High School, 23 unit-plan graded school buildings, the Union Station, new Federal Building, Pierce County Courthouse, city hall, the Tacoma, Fidelity, Perkins and National Realty office buildings, state armory, library, State Historical Society Building and 78 church edifices.

INSTITUTIONS. Tacoma is the seat of Whitworth College (Presbyterian); the University of Puget Sound (Methodist); the Pacific Lutheran Academy (Christian); Annie Wright Seminary (Episcopal); and the Aquinas and Visitation academies (Catholic). Adjoining the Stadium High School Building, a magnificent specimen of Gothic architecture, costing $500,000, is a Stadium seating 40,000. The benevolent and charitable institutions include the Tacoma General Hospital, St. Joseph's Hospital, Northern Pacific Hospital, a city and county hospital, a children's home, and two shelter homes for women and girls.

INDUSTRIES. Tacoma is the center of the Douglas-fir lumber manufacturing industry of the Pacific Northwest. The great Guggenheim Smelter at Tacoma reduces and turns out annually lead, copper, gold and silver worth about $10,000,000. Along the wharves are immense grain warehouses, flouring mills and elevators, and great quantities of coal are shipped for ports on the Pacific coast. There are also the Pacific coast car shops of two transcontinental railroads, shipyards, rolling mills, packing plants and brickyards.

HISTORY. Commencement Bay was surveyed by Lieut. Charles Wilkes in 1841 for the United States Government, and the site of the town was laid out in 1868 by Gen. Morton McCarver and called Commencement City. The name was later changed to Tacoma, an Indian name, meaning nourishing breast, and the correct name for the great mountain southeast of the city, which is officially called Rainier. The place became the county seat in 1880, and 1909 the so-called commission form of city government was adopted. Population in 1920, U. S. Census, 96,965.

Tacon'ic Mountains, a short range of mountains bordering Massachusetts and New York and extending for a short distance into Vermont. The range is an extension eastward of the Highlands of the Hudson. On the east it merges into the Berkshire Hills and on the north into the Green Mountains.

Tactics, *Tak' tiks,* **Military,** the art of drilling and arranging troops. Tactics involves every detail of instruction and arrangement, from the drilling of the raw recruit to the placing and moving of the various divisions of the army in the field. The tactical unit is the battalion. In time of action the command may be divided as occasion requires. It usually consists of 1000 men in four companies, each company being divided into three platoons, and each platoon into two sections. A company front extends 100 yards, that of a battalion 400. In going into battle the regiments move forward in columns until they come in range of the cannon; then they are formed into line, and continue with companies marching in columns of sections until they reach the range of infantry fire, where they deploy as skirmishers. There are generally three lines of battle, the firing line, the line of support and the reserves, each in turn going forward into the firing line, as the case may require.

Taft, Lorado (1860-), an American sculptor, born in Elmwood, Ill. He was educated at the University of Illi-

nois and at the School of Fine Arts, Paris. In 1886 he became an instructor in the Chicago Art Institute, and later, extension lecturer of the University of Chicago. He is one of the leading artistic personalities in the Middle West. His works include two groups of figures for the World's Fair at Chicago (1893); groups for the Louisiana Purchase Exposition; *The Solitude of the Soul; The Great Lakes,* representing the five Great Lakes, typified by five female figures; a large group called *The Blind,* illustrating Maeterlinck's idea embodied in his drama of the same title; a colossal statue of the Illinois chief Black Hawk, near Oregon, Ill.; and the Columbus Memorial Fountain at Washington, D. C. He has written a *History of American Sculpture.*

Taft, William Howard (1857-), the twenty-seventh president of the United States, born in Cincinnati, Ohio. In 1878 he graduated with honors from Yale University, and two years later completed a course of law in Cincinnati College. After being admitted to the bar he filled a number of public offices in his native state, the most important being that of justice of the Supreme Court. In 1890 he became solicitor-general of the United States, and from 1892 to 1900 he was judge of the United States Circuit Court for the sixth circuit. He found this office a most congenial one and filled it with eminent success.

In 1900 Mr. Taft was called by President McKinley into a new field of action by being appointed president of the United States Philippine Commission, an office which was changed in 1901 to that of civil governor of the Philippines. In this position he combined the qualities of statesmanship and humanitarianism that were needed to solve the intricate problems that presented themselves, and the report of the work accomplished during his administration reflected great credit upon his judgment and ability. Among the reforms which were instituted under his direction were a public school system, civil government in all the provinces, organized methods of dealing with sickness and disease, and judiciary and postal systems. He also brought about a satisfactory adjustment of the legal relations between these institutions and the United States.

By order of the President he made a personal visit to Pope Leo XIII in 1902 to confer with him in regard to the purchase by the United States Government of land in the Philippines owned by Roman Catholic orders; in 1904 he was appointed secretary of war by President Roosevelt to succeed Elihu Root. In 1906 he was sent to Cuba to bring about peaceful relations between the opposing factions there, and for a time was provisional governor; and in 1907 he returned to the Philippines to attend the opening of the first Philippine Congress. On his return he made a trip around the world, during which he delivered an important address on the subject of world peace, in St. Petersburg, and had a private interview with the Emperor of Japan.

In 1908 Mr. Taft was elected president of the United States by the Republican Party, with James S. Sherman as vice-president. The popular vote gave him a plurality of 1,233,494 votes over his chief opponent, William Jennings Bryan. Important achievements and events of Mr. Taft's administration were the passing of the Payne Tariff Law, the discovery of the North Pole, by Peary, the creation of a Federal Court of Commerce, the establishment of the bureau of mines and of the children's bureau, the institution of postal savings banks and of the parcel post, the admission of the states of New Mexico and Arizona and the settlement of the fisheries dispute by The Hague Court of Arbitration.

President Taft's advocacy of the unpopular Payne Tariff Law and his unsympathetic attitude toward the "Insurgents" of the Republican Party were important factors in weakening his power with the people. As early as 1910

the Democrats made important gains in local and congressional elections, while the progressive movement in the Republican Party continued to develop leaders hostile to the President. In the campaign previous to the Republican National Convention, Mr. Taft engaged in an extensive speaking tour through several states holding preferential primaries, but was generally unsuccessful in the primary elections. The progressive wing of the party, whose principal candidate was Ex-President Roosevelt, and the conservative wing, supporting President Taft, entered upon a bitter struggle in the convention which met in Chicago in 1912. The nomination of the latter candidate was followed by the withdrawal of a large number of Roosevelt delegates from the convention hall, and the first steps were taken to form a new party (See POLITICAL PARTIES IN THE UNITED STATES, subhead *Progressive Party*). With the Republican Party thus disunited, Democratic victory was assured. On June 30, 1921, President Harding nominated Mr. Taft to be chief justice of the Supreme Court of the United States and the nomination was immediately confirmed by the Senate by an almost unanimous vote.

Ta'gus, a river of the Iberian Peninsula. It rises near the central part of Spain, in the Sierra de Albarracin, flows southwest through Spain and Portugal, passes the city of Lisbon and empties into the Atlantic Ocean. It is 565 m. long, has a rapid current and is navigated 105 m. to Abrantes. Important tributaries are the Alagon, the Alberche and the Jarama.

Tai'lor Bird, a bird of the Warbler Family. The tailor bird is about the size of the English sparrow (five inches). Its bill is long and slender and slightly curved downward. In color it has greenish, or olive, upper parts, whitish under parts and a bright red patch on the top of its head. Its name is derived from its method of building a nest, which is to sew together two leaves at the end of a bough, or to roll a large leaf and sew the margins together. The work is performed by the long bill, which pierces the leaf and pushes and pulls the vegetable fiber, which constitutes the thread, through it. The bottom of this peculiar nest is lined with cottonlike vegetable substance, on which the six or eight eggs are laid. The tailor bird is an inhabitant of India.

Taine, *Tane,* **Hippolyte Adolphe** (1828-1893), a French historian and critic, born at Vouziers. He studied in Paris, became interested in philosophy and later studied medicine and the sciences. In 1864 he was made professor in the School of Fine Arts. In his writings he revealed the thinking of an acute and brilliant scholar, a logic that was mechanical and a mastery of minute observation that was almost unparalleled. His favorite thesis that environment is the cause of literary evolution has proved more stimulating than sound, and he represents in literary criticism the beginning of the scientific spirit, which has had great vogue among his successors. He has written *Travels in the Pyrenees, History of English Literature, English Idealism, English Positivism, Philosophy of Art in Italy, Journey to Italy, The Ideal in Art, Notes on Paris* and *Notes on England.*

Taj Mahal, *Tahj Ma hahl',* a white marble mausoleum a mile east of Agra, India, constructed by Shah Jehan (1628-1658) as a burial place for his favorite wife. The building is in the form of an octagon, with sides of 130 ft. and a height of 70 ft. The dome surmounting it rises 120 ft. above the roof, and the building is flanked by four minarets 133 ft. high. In the central chamber, above the vault which contains the bodies of the Emperor and his wife, are two cenotaphs surrounded by a marble screen. The exterior of the building is covered with arabesques and passages from the Koran in mosaic. The Taj Mahal is said to have occupied 22 years in building. Its cost has been variously estimated, the figures ranging from $9,000,000 to $60,000,000.

Talc, one of the most important of nonmetallic minerals, found in all parts of the world. It is sometimes massive, often in foliations, or layers. The color ranges from white to gray, yellow and often green, with a pearly luster. It is uninjured by acids or heat. Foliated varieties are often transparent, while massive talc is opaque. Talc is very soft, but tough and durable, and takes a high polish. Powdered talc is used for toilet powders and cheap soap, as a base for fireproof paints, in making foundry facings, electric insulators, and boiler and steampipe coverings, and in the manufacture of dynamite. A sort of fibrous talc is used in the manufacture of paper. Soapstone is a valuable variety of talc. See SOAPSTONE.

Tal'ent, a unit of weight and value employed by the ancient Greeks, Hebrews, Babylonians and other nations. It is supposed that the Greeks obtained the system from the Babylonians, who reckoned 60 shekels to a mina and 60 minæ to a talent. The weight varied among different nations, but there seem to have been two standards. In one the weight was 37.8 kilograms; in the other, 26 kilograms. The value of the silver talent of Attica was about $1080. The talent of the Romans was of still different value, being reckoned as worth $480 and $365, according to weight.

Tal'ipot, an interesting tree of the Palm Family, growing in India and Ceylon and noted for its large fanlike leaves and enormous clusters of flowers. When young, the leaves grow near the ground, but as the tree matures, it develops a straight, cylindrical stem that carries the broad leaves high above the reach of the ordinary person. These leaves are borne as sunshades in ceremonial processions and are elsewhere used as thatch for houses, as fans and in the manufacture of a kind of paper. From the center of the leaf clusters rises a conical, covered stalk of blossoms whose main stalk often becomes 30 ft. long, and which branches until its base is fully as wide; some single stalks have been said to bear at least 100,000 blossoms, which have, unfortunately, a very disagreeable odor. The pith of the tree makes a sagolike meal used for food.

Tal"lahas'see, Fla., the capital of the state and county seat of Leon Co., 165 m. w. of Jacksonville, on the Seaboard Air Line, the Georgia, Florida & Alabama and other railroads. In the surrounding district, cotton, tobacco and sugar cane are grown, and stock raising and dairying are important activities. The manufacturing interests are chiefly centered in cigar making and cottonseed pressing for the production of oil. Tallahassee is situated on a considerable elevation and is well laid out, with broad streets; beautiful shade trees add much to the attractiveness of the city. Here are located the Florida Female College (of equal rank with the state university, for men), the Florida State Normal and Industrial School (for negroes), an agricultural and mechanical college, a Confederate Soldiers' and Sailors' Home and a hospital for the insane. There are three valuable libraries—the Florida State Library, the Supreme Court Library and the David S. Walker Library. Among other noteworthy features are the state capitol, the post office, courthouse and Bloxham Park. In the vicinity are several picturesque lakes. In 1824 Tallahassee was laid out on a site which the United States Government had formerly selected as that for the capital of the Territory of Florida. The place was incorporated in 1827 and remained the capital after Florida was admitted to the Union in 1845. Population in 1920, U. S. Census, 5,637.

Talleyrand-Périgord, *Tal" le" rahn'-Pa" re" gor',* **Charles Maurice,** DUKE OF (1754-1838), a French statesman, born in Paris. An accident in infancy made him lame for life. He was educated for the priesthood, but did not find it congenial. In 1780 he was agent-general for the clergy, a position which brought him in frequent touch with the govern-

ment, and he made a thorough study of public business. Notwithstanding his immoral practices, his ability as an administrator secured for him the bishopric of Autun. He represented his diocese in the States-General of 1789, where he advocated uniting with the Third Estate. He was appointed one of the commission to frame a constitution for the nation, and also assisted in preparing the Declaration of Rights. In February, 1790, he became president of the National Assembly. Meantime his political activities against the Church had caused him to be excommunicated by the Pope. In 1792 he went on a mission to England, where he remained for two years, then went to the United States, where he spent more than a year.

On his return to France in 1796 Talleyrand allied himself to Napoleon and was one of the chief participants in the coup which overthrew the Directory. Napoleon appointed him minister of foreign affairs, and in this capacity he negotiated with the American envoys regarding the purchase of Louisiana. He was a brilliant diplomatist and wielded tremendous influence in consolidating the powers of Bonaparte, and in 1806 he was made Prince of Benevento. He opposed Napoleon's policy towards England, however, as disastrous. In 1807 he resigned as minister of foreign affairs and retired to his estates. After the overthrow of Napoleon he again became minister of foreign affairs in the first government of Louis XVIII. He represented France at the Congress of Vienna, where he secured numerous advantages for his country. Louis Philippe sent him as ambassador to England, where he succeeded in establishing friendly relations between the two countries. In 1834 he negotiated the Quadruple Alliance between Great Britain, France, Spain and Portugal. This was his last significant public work. He is regarded as one of the most brilliant and at the same time most unscrupulous of diplomats and politicians.

Tal'low, a product obtained chiefly from rendering the fat of sheep, cattle and goats. It is an indefinite mixture of the harder and less easily melted fats and consists mainly of olein, stearin and palmitin. Pure tallow is somewhat whiter than lard and is tasteless, without color or odor, and melts at 110° F. It is soluble in boiling alcohol and has a specific gravity of 0.935. In manufacturing tallow the fats are cut into small pieces and boiled with water, the fatty matter melting and rising to the surface. This is removed by skimming. The tissues of the natural fat remain behind, but they are afterwards pressed to get whatever tallow may be left in them. Tallow is extensively used in making soap, candles and lubricants, and in the dressing of leather. The better grades are employed in making oleomargarine. See SOAP; CANDLE; OLEOMARGARINE.

Tallow Tree, a name applied to many trees which produce a tallowlike substance, but in America particularly given to a Chinese tree of the Spurge Family, which has been naturalized in the Southern States. The tree is above medium size with smooth, long-stemmed leaves and spikes of insignificant flowers. The seeds are embedded in a tallowlike mass within dry capsules which, in the autumn, burst to discharge the seeds. The Chinese gather the seeds, crush and boil them and skim off the tallow for candles or soap. Other trees of Eastern countries are called tallow trees, and the name is sometimes applied to the American candlenut.

Tal'mage, Thomas De Witt (1832-1902), American pulpit orator, born at Bound Brook, N. J. He took a partial course at the University of the City of New York, now New York University; entered the theological seminary of the Dutch Reformed Church of New Brunswick, N. J., from which he graduated in 1856; was ordained the same year and became pastor of the Reformed Church in Belleville, N. J. From 1859 to 1862 he was pastor at Syracuse, N. Y., and from 1862 to 1869, pastor in Philadel-

phia. In 1869 he removed to Brooklyn, N. Y., where he became pastor of the Central Presbyterian Church, known as The Tabernacle. The Tabernacle was burned and rebuilt in 1872, and again in 1889. It was burned a third time in 1894, but was never rebuilt, and the organization disbanded. Mr. Talmage preached for several months in the Academy of Music, New York City, and then in 1895 became assistant pastor of the First Presbyterian Church, Washington, D. C., where he continued to serve until 1899. Mr. Talmage was a popular preacher and the people flocked in large crowds to hear him. He was also a popular lecturer, both at home and abroad. His sermons were for many years published weekly and translated into many different languages, and have since been published in volumes. From 1873-1876 he was editor of the *Christian at Work,* from 1877-1878 of the *Advance,* and from 1890-1902 of *The Christian Herald.*

Tal'mud, The, the body of Jewish civil and ecclesiastical law not comprised in the Pentateuch. There are two parts: the Mishna, or laws written in Hebrew; and the Gemara, or commentary on the law, written in Aramaic. The Mishna consists of 63 treatises, with six main divisions: (1) on tithes, agriculture, etc.; (2) on festivals, feasts and the Sabbath; (3) on marriage, vows and oaths; (4) on penal laws and ethics; (5) on sacrifices, including a description of the Temple; (6) on purifications. The Gemara includes the comments on the Mishna by the rabbis of Babylon and Palestine, from the third to the sixth century, when the two were united in a final compilation.

Tamaqua, *Ta maw' kwa,* **Pa.,** a city of Schuylkill Co., 17 m. n.e. of Pottsville and 38 m. n. of Reading, on the Tamaqua, or Little Schuylkill, River, and on the Philadelphia & Reading and the Central of New Jersey railroads. It is known for its extensive coal-mining interests and has considerable industrial importance. The town has machine shops, foundries, flour and powder mills and furniture factories, and manufactories of shirtwaists, knit goods, hosiery and other articles. Tamaqua was settled in 1799 and incorporated as a borough in 1833. Population in 1920, U. S. Census, 12,363.

Tam'arind, a handsome tree of the Pulse, or Pea, Family, bearing a fruit also known as tamarind. The name means date of India, and is a native of India or northern Africa. The tree grows to a height of from 30 to 80 ft. and has beautifully spreading branches covered thickly with light green leaves, which resemble those of the American locust. The flowers are red or yellow and fragrant, and are borne in terminal clusters; that is, at the ends of the branches. They have three petals and four sepals. The fruit is a brittle pod, brown in color, and filled with a reddish pulp, from which a jam is made. The seeds, which are enclosed in the pulp, are flat and sharply angled. The tree is valuable for its uses in medicine and for its beautifully grained wood, that of the root being especially well marked. The tamarind is not yet grown with success in the United States.

Tam'arisk, a shrub or low tree of Asia and a member of the Tamarisk Family. In the United States it is occasionally used as an ornamental shrub, though it is not hardy in the North. The leaves are tiny and sharp-pointed and pressed close to the slender stems. The flowers are white or purple and grow in spikes or in longer clusters. The seeds are also very small and bear a tuft of fine hairs at the apex. A sweet gum, which exudes from the stem, is gathered by the Arabs, always before sunrise, boiled, strained and eaten as a sort of honey. This wax or a cake made therefrom is called manna, and has by some been thought to be the original manna of the wilderness.

Tambourine, *Tam" boo reen',* a musical instrument consisting of a piece of parchment stretched over the top of a hoop which has several pairs of small

metallic disks set in the rim. When the parchment is struck the disks are set in vibration and make a jingling sound, which is often prolonged by the player's shaking the tambourine. The tambourine is played with the fingers, hand or elbow.

Tam'many, the name applied to a powerful Democratic organization in New York City. The name is adapted from that of an Indian chief, Tamanend, of the Lenni Lenape, or Delaware, tribe, who is said to have signed the treaty with William Penn. Washington's Pennsylvania troops chose Tamanend as their patron saint. May 12, 1789, William Mooney, who had formerly been active as one of the patriotic society of the Sons of Liberty, founded in New York a patriotic and social organization, the secret society of St. Tammany, or Columbian Order, which was incorporated in 1805 as a fraternal aid association. In 1811 the society built its first hall, and in 1867 moved into the present Tammany Hall. The political organization is nominally distinct from the society, but the two may be regarded as almost identical, the leadership of both being practically in the same hands.

The society early took an active interest in politics and declared itself for Democracy, becoming allied in 1798 with the Democratic-Republicans as opposed to the Federalists. From 1800 until the present time Tammany has assumed to be the local representative of the National Democratic Party and has exerted a powerful influence on the political history of New York State as well as New York City, having controlled a vast majority of the city's voters. In order to secure proper discipline within the organization, great power was given a few individuals or "bosses." The climax was reached in 1869-71, when William M. Tweed and certain of his associates were proved to have robbed the city of millions by securing the city government and gaining control of fiscal appropriations. This combination was known as the "Tweed Ring." The power of Tammany is traceable to more than machine organization, as it makes a systematic appeal to the masses for votes, and accomplishes its purpose by acts of charity and the astute use of patronage. It also gains tens of thousands of votes by virtue of its position as the representative Democratic Party in New York.

Tam'pa, Fla., a city and county seat of Hillsboro Co., picturesquely situated on an arm of the Gulf of Mexico, having Old Tampa Bay on one side and Hillsboro Bay on the other, while the Gulf lies 16 m. south, at the convergence of the two bays. The Atlantic Coast Line, the Seaboard Air Line, the Tampa Northern and the Tampa & Gulf Coast railroads enter the city. The delightful climatic conditions make Tampa a popular resort for tourists and health seekers, and it has a wealth of tropical foliage and shrubbery, which makes it an especially beautiful spot. The Tampa Bay Hotel, one of the largest tourist hotels in America, built by the late Henry B. Plant at a cost of $3,000,000, is owned by the city of Tampa. Other notable buildings are the Government Building, Y. M. C. A., New Union Station, Greeson Theater, Gordon Keller Memorial Hospital, Spanish Sanitarium, the Elks' Yacht Club, Automobile Club, German Club and Spanish Club. Tampa has a fine public school system, having about 19 schools, and also several private schools and business colleges. There are 51½ m. of street railway in Tampa, which give access to De Soto Park, the scene of the encampment of the United States volunteers during the Spanish-American War, Ballust Point, Palmaceia Springs, Sulphur Springs and Palmetto Beach. The imports are principally merchandise, tobacco and fruits, while the chief export is cigars, there being over 200 factories for their manufacture. Other exports are lumber, naval stores, phosphate, cattle, chickens and eggs.

East Tampa has been annexed to Tampa to allow the city to control the new harbor on which the government has appropriated $1,750,000. When this

is completed it will be the largest municipally-controlled harbor and docks in the United States. Tampa is the most convenient location to the central South American and West Indian ports, and is preparing to handle the vast commerce coming into the Gulf from the Panama Canal.

Tampa was settled in 1848 and incorporated in 1886, but its great increase in population during the last 30 years shows its phenomenal growth. Population in 1920, U. S. Census, 51,608.

Tanager, *Tan' a jer,* **Family.** The tanagers are mostly birds of the tropics, only five species being found in North America north of Mexico. They are somewhat smaller than the robin (eight to nine inches in length), and are most nearly related to the finches or sparrows.

Scarlet Tanager. This bird is about seven and one-fourth inches long, and in summer has a bright scarlet plumage, with black wings and tail. The scarlet tanagers are often found in parks, orchards and open fields. They feed upon berries, seeds and insects, which they frequently catch on the wing. The song resembles that of the robin, but is somewhat harsher, and has a higher pitch. The female is yellowish-green, lighter on the breast, with wings and tail a dull brown. In fall and winter the male is greenish, with black wings and tail.

Summer Tanager, or Summer Redbird. This is a bright scarlet bird, with brown wings and tail tipped with red. The female is olive-green, with the under parts yellowish. It ranges from New Jersey southward.

The nest of the tanager is constructed on a horizontal limb of a tree at a height of from 6 to 25 ft. above the ground, and is roughly composed of small sticks, roots and pieces of bark. Three to five spotted eggs are laid, which hatch out in about 13 days. The young males resemble the female the first year, not acquiring the brilliant coat until they are a year old, and the full mating plumage is not acquired until the second year.

Tan'cred (about 1050-1112), a celebrated hero of the First Crusade. He was distinguished for the part he took in the siege of Nicæa, at the capture of Jerusalem and at Ascalon. After the fall of Jerusalem before the Crusades he was made Prince of Galilee. After the death of Godfrey he gave up his possessions around Jerusalem and later became Prince of Antioch. Tasso immortalized him in his poem, *Jerusalem Delivered.*

Taney, *Taw' ny,* **Roger Brooke** (1777-1864), an American jurist, born in Maryland and educated at Dickinson College, Pennsylvania. He was admitted to the bar in 1799 and to the State Senate, as a Federalist, in 1816. Later, having joined the Democrats, he supported Andrew Jackson, who appointed him attorney-general in 1831. In 1833, as secretary of the treasury, he encouraged and carried out the removal of the government deposits from the United States Bank. In 1836 his appointment to succeed Chief Justice Marshall was confirmed. Many of his decisions while he was on the Supreme Court bench were severely criticized, the most notable of these being the one in connection with the Dred Scott Case. See Dred Scott Case.

Tanganyika, *Tahn" gahn ye' kah,* a large lake in central Africa, situated 190 m. n.w. of Lake Nyassa and 175 m. s.w. of the Victoria Nyanza. It is 400 m. long, from 20 to 40 m. wide, and has an area of over 12,000 sq. m. The mountains of the Rift Valley, at intervals steep and rocky, form its boundary, and it has a depth of from 500 to over 2000 ft. There are few shoals and reefs, but frequent hurricanes endanger navigation. Its waters, generally fresh, though at times becoming brackish, contain the crocodile, the hippopotamus, fresh-water fish, deep-water Mollusks and crabs. There are trading posts and mission stations on its coasts. The lake was discovered by Burton and Speke in 1858, and has since been explored by Livingstone, Stanley and others.

Tangier, *Tan jeer',* an important seaport of Morocco, and capital of the Province of Haábat, situated at the western extremity of the Strait of Gibraltar. It is an interesting city because of its historic walls and gateways, its quaint buildings, and steep, narrow streets filled with merchandise brought by caravan across the Sahara. The few modern buildings are the homes of the foreign consuls and of the wealthy merchants, and the new hotels for the convenience of tourists. Otherwise the buildings are mostly of one story, and straggle along the streets in unhindered confusion. The harbor, though a fine one, is not so much frequented as formerly, since the most of the Mediterranean trade follows the Spanish coast. Trade is chiefly in grain, hides, wax, wool, brass, cattle, poultry and the famous Morocco leather. For the tempting of tourists handsome rugs, fezes and many Oriental ornaments are constantly on display. Population, 35,000.

Tannhäuser, *Tahn' hoi zer,* the hero of an old German story which is supposed to have originated with a minnesinger of the 13th century. Tannhäuser is a chivalrous knight beloved by a lady named Lisaura. Under the influence of a sage named Hilario, Tannhäuser is led to seek association with some beautiful spirit in mortal form. He is directed by Hilario to Venusberg, a hill near Freiburg, where Venus holds her court. The news of his departure for this scene of wickedness causes Lisaura to kill herself. In the course of time Tannhäuser repents, and, guided by the voice of the Virgin Mary, seeks absolution from Pope Urban. The Pope declares that it is as impossible for the knight to obtain forgiveness as it is for the staff which he holds in his hand to produce green leaves. In despair, Tannhäuser returns to the haunts of Venus. Meanwhile, Urban's staff has begun to put forth leaves, which the Pope interprets as a sign of God's mercy toward the erring knight. Too late he sends messengers for Tannhäuser, who is never again seen on earth. The Tannhäuser legend has received several literary treatments and is the subject of Richard Wagner's opera *Tannhäuser.*

Tan'nin, or **Tan'nic Acid,** a complex compound of carbon, hydrogen and oxygen, which exists in nutgalls, sumac, quinine, the bark of many trees, coffee beans, tea, etc. Chemically, it may be considered a salt of gallic acid. Tannin is a yellowish-white powder which dissolves in water, but only slightly in alcohol or ether. The tannin derived from the oak gall and from bark is the most familiarly known from its use in medicine and in "tanning" animal hides. Its use in the latter case comes from its forming with the hide an insoluble substance which prevents decay and renders the leather soft. See LEATHER.

Tanning. See LEATHER.

Tansy, *Tan' zy,* a common, aromatic roadside weed of the Composite Family. It is a low plant with short, clustered stems which may grow to a height of three feet but are generally shorter. The leaves are bright green in color and are so finely-divided and so crinkled as to present a pretty, feathery appearance. In August, handsome, flat-topped clusters of single or double yellow flowers appear. On the shores of the Great Lakes and north to Hudson Bay a coarse tansy with larger flowers is found. Tansy contains a bitter oil called oil of tansy which is poisonous but is sparingly used in medicines. Herb doctors have made use of tansy as a tonic, and probably for that purpose it was introduced into the United States from its European home.

Tan'talus, in Greek myths, King of Lydia, son of Jupiter, and father of Pelops and Niobe. He incurred the enmity of the gods, either for having served to them his son's body (See PELOPS), for having stolen some of the divine food of which he had been privileged to partake, or for having divulged heavenly secrets. One account makes his punishment to have been eternal fear of a huge rock, which momentarily threat-

ened to crush him. Another story says that Tantalus stood in a pond, chin deep in water; yet that he was always thirsty. Forever, as he stooped to drink, the waters fled, eluding him. Always, as he reached for fruits hanging temptingly near, the winds hurled them past his grasp.

Taoism, *Tou' iz'm,* one of the two great religions of China, not counting Christianity, which is rapidly gaining a foothold there. Taoism was founded by Lao-Tse, who lived in the sixth century B. C. Traces of the religion that he founded appear long before his time. His little work *Classic of the Way and of Virtue* teaches naturalism, or rationalism, gentleness, humility, economy and the return of good for evil.

Tapajos, *Tah" pah zhoshe',* a river of Brazil. It rises in the western part of the State of Matto Grosso, flows north and northeast, and, after a course of about 1100 m., becomes a tributary of the Amazon at Santarem. Large vessels ascend only 200 m., but small ones for almost the entire length.

Tap'estry, a fabric originally made by hand, consisting of a warp upon which gold threads, colored silk and worsted were fixed to produce a pattern, all being worked with a needle instead of a shuttle. It had more solidity and excellence in design than woven cloth, and the patterns were rarely duplicated. For these reasons hand tapestry has always been highly prized among art connoisseurs. About the ninth century tapestry began to be made in a loom, and in the 14th and 15th centuries, Brussels, Bruges, Antwerp, Lille and Valenciennes were noted for their fine tapestries. The making of tapestry was introduced into England near the end of the reign of Henry VIII. The most famous factory for making tapestry is that of the Gobelins in Paris, which was established in 1667 under Louis XIV. The city of Arras in France has produced the finest tapestry, a fact which has given us the term *arras* for fine tapestry. So slow is the work of making this that completing 39 square inches is considered a year's work for one artist. Tapestry usually contains Biblical and historical figures, and is used for decorating walls of palaces and churches and sometimes for drop curtains in theaters. There are valuable state collections of tapestries in various cities and museums of Europe. Among the famous collection of tapestry is a series preserved in the Vatican illustrating scenes in the lives of the apostles, copies from cartoons made by Raphæl. The celebrated Bayeaux Tapestry in Bayeaux, France, is really an interesting example of embroidery. See Embroidery; Bayeaux Tapestry.

Tape'worm", an internal parasite which infests the bodies of Vertebrates and which is usually found in the alimentary canal. It is shaped like a worm and varies in length from a few inches to several yards. The animal has neither mouth nor digestive organs, but absorbs nourishment through its skin. The head is provided with hooks, or suckers, by means of which it attaches itself to the membranes of its host, and the body is divided into segments. These segments, or buds, grow from the head, the tail segment being the oldest. From time to time the buds slough off and pass out from the body. They have the power of reproducing; and if by chance they find their way into another Vertebrate body, through drinking water or other medium, they develop into tapeworms. The buds never develop in the same body with the adult worm. Some species of tapeworms pass from the alimentary tract by perforating the tissues. They may be taken to another part of the body by the blood, and penetrate into some solid substance and there remain during the life of the host. Certain species are found in the muscles of the ox and the hog and in the brains of sheep. Persons having tapeworm are troubled with pain in the stomach, constant craving for food, restlessness and loss of strength. Certain physicians' prescriptions kill the tapeworm and cause it to pass from the system.